PUBLISHED MONTHLY

$10.00 A YEAR SINGLE COPIES $1.00

WOOD'S MEDICAL AND SURGICAL MONOGRAPHS

CONTENTS

THE TREATMENT OF SYPHILIS AT THE PRESENT TIME
BY DR. MAXIMILIAN VON ZEISSL

THE TREATMENT OF INEBRIETY IN THE HIGHER AND EDUCATED CLASSES
BY JAMES STEWART, B.A.

MANUAL OF HYPODERMIC MEDICATION
BY DRS. BOURNEVILLE AND BRICON

WILLIAM WOOD AND COMPANY PUBLISHERS
56 & 58 LAFAYETTE PLACE NEW YORK

VOLUME 3 NUMBER 2

AUGUST 1889

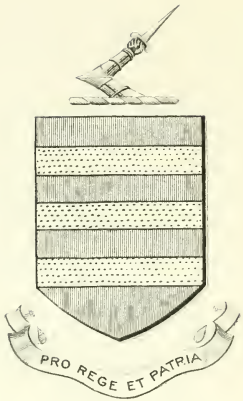
Co

Th

Pa

Ps

Se



Bequeathed to the Library of the
University of Toronto by
Irving Heward Cameron, Esq., M.B.
Sometime Professor of Surgery
in the Faculty of Medicine

P
Med.
W

VOLUME III. NUMBER 2.

WOOD'S

Medical and Surgical

MONOGRAPHS

Consisting of Original Treatises and of Complete Reproductions, in English, of Books and Monographs selected from the latest literature of foreign countries, with all illustrations, etc.

CONTENTS

THE TREATMENT OF SYPHILIS AT THE PRESENT TIME. By Dr. MAXIMILIAN VON ZEISSL.

THE TREATMENT OF INEBRIETY IN THE HIGHER AND EDUCATED CLASSES. By JAMES STEWART, B.A.

MANUAL OF HYPODERMIC MEDICATION. By Drs. BOURNEVILLE and BRICON.

PUBLISHED MONTHLY

PRICE, $10.00 A YEAR SINGLE COPIES, $1.00

AUGUST, 1889

MAR 1

NEW YORK
WILLIAM WOOD AND COMPANY.
56 AND 58 LAFAYETTE PLACE

297923
3
14
34

Entered at the Post Office at New York, as second-class matter.
Copyright by Wm. Wood & Co., 1889.

PRESS OF
THE PUBLISHERS' PRINTING COMPANY,
157-159 WILLIAM STREET,
NEW YORK.

CONTENTS.

THE TREATMENT OF SYPHILIS AT THE PRESENT TIME.

PAGE

Changes in the Treatment of Syphilis in the Course of Centuries, 257

Cauterization or Excision of the Primary Lesion, ... 267

Preventive General Treatment, ... 274

How Long should the Treatment of Syphilis be Continued, . 278

The Author's Method of Treatment, ... 287

THE TREATMENT OF INEBRIETY IN THE HIGHER AND EDUCATED CLASSES.

The "Home" Treatment, ... 293

MANUAL OF HYPODERMIC MEDICATION.

Preface, ... 309

Translator's Preface, ... 309

Note by the American Publishers, ... 311

History, ... 312

Subcutaneous Absorption, ... 314

Solutions, ... 316

Instruments and Operative Procedure, ... 320

Manual of Subcutaneous Injections, ... 335

Bibliography, ... 519

Table of Antidotes and Antagonisms, ... 521

Hypodermic Posological Table, ... 525

Therapeutic Index of Diseases, ... 531

THE TREATMENT OF SYPHILIS

AT THE PRESENT TIME

BY

DR. MAXIMILIAN VON ZEISSL

Docent of the Vienna University.

THE TREATMENT OF SYPHILIS

AT THE PRESENT TIME.

THE fortunes and changes which the treatment of syphilis has experienced in the course of centuries are almost as numerous and varying as the symptoms which syphilis may produce in the human body. Almost coincidently with the appearance of the disease at the end of the fifteenth century, mercury is found mentioned as a remedy against it. However long mercury has been employed as an antisyphilitic, general assent has not yet been gained by any doctrine concerning the utility of its administration, the results which it may produce in syphilitic patients, the period at which its administration should be begun and how long it is to be continued. In opposition to mercury, guaiac, sarsaparilla, smilax chinæ, sassafras and many similar remedies have been recommended in the course of time, but a powerful and worthy rival first arose in the shape of iodine which has been universally employed since the second decade of this century.

In addition to treatment with the remedies mentioned, the expectant treatment of syphilis, without administration of mercury, has repeatedly found adherents, and the claim has often been advanced that constitutional syphilis results from the use of mercury. Some physicians claimed to cure syphilis by hunger cures, cold-water cures, others by so-called syphilization or, more correctly, curative inoculation of chancre. If, without making any pretensions to completeness, we review the literature of our specialty since the year 1859, we will find views, that possess certain features in common, advocated by Baerensprung, Diday and H. Zeissl. Baerensprung claims that mercury exercises a curative action on all syphilitic lesions and

that it rapidly causes disappearance of the symptoms of syphilis. But, according to him, the further development of the morbid process is not prevented by mercury; the outbreak of new symptoms is only delayed and the entire disease protracted. Under these circumstances syphilis often passes into its tertiary forms and finally may become incurable. Baerensprung also expresses the following opinion: "Tertiary syphilis is not mercurialism, it is always syphilis, but a modified syphilis, syphilis in an organism changed by mercury, as has been made perfectly clear not alone by me, but also by Fernelius and others." In his article in the "Charité-Annalen" Baerensprung says: "Whatever treatment may be adopted, syphilis is a disease which impairs profoundly the entire organism. The cases of rapid recovery within a few weeks are rare exceptions. As a rule, a very gradual extinction follows, and this may happen with mercurial as well as non-mercurial treatment. The advantage of mercurial treatment resides in the fact that it rapidly ameliorates the individual symptoms of the disease and effects their recovery, but this is more than counterbalanced by a double disadvantage. Inasmuch as the mercury impairs the entire constitution, it favors the development of destructive local forms; by making the disease latent often for months and years, it delays definitive recovery. Non-mercurial treatment is often unable to prevent the severe and extensive appearance of the symptoms, particularly at the beginning of the disease, but it offers the great advantage that it never conceals the disease when it is not cured, and accelerates its definitive recovery."

Diday divides syphilis, according to the severity of its symptoms, in the following way: 1, syphilis which is only indicated (ébauchée, once among 93 cases); 2, feeble syphilis (53 times among 93 cases); 3, severe syphilis (29 times among 93 cases); 4, galloping syphilis (4 times among 93 cases); 5, tertiary syphilis or syphilitic diathesis.

Diday says: From 1838–1855 I treated my syphilitic patients according to the old routine, from 1855–1860 I systematically dispensed with the use of mercury during the existence of the primary lesion and the first outbreak of secondary symptoms. I used mercury only in exceptional cases, when the nature of the symptoms imperatively demanded it. Finally, since 1860 Diday, under the influence of these two forms of treatment,

has devised a method whose principle consists in giving mercury temporarily, not alone when it is indispensable, but whenever its administration appears useful. He declares his adherence to the belief that mercury is unable to destroy the virus of syphilis and divides the methods of treatment into "the regular method" and an "opportunistic method," which he practises. This opportunistic method simply purposes to aid the efforts made by nature to cure the disease and the action of hygienic conditions upon it. The "regular method" requires two or three times as long as the opportunistic method in order to effect recovery. Diday attaches great importance to the regulation of the patient's regimen in the widest sense of the word and emphasizes that each individual has his own peculiar form of syphilis because every one has his own mode of life. He also says that the mode of action of mercury is unknown and denies its preventive efficacy. The fact that the procreation of healthy children by individuals suffering from latent syphilis is often secured by carrying out mercurial treatment, he explains, not as a preventive action, but as the removal of a morbid symptom.

The following is the course of Diday's method.

As he denies a preventive action from the use of mercury, he does not administer it while the primary lesion is the only sign of syphilis. Among 74 syphilitics under his observation, 49 did not use mercury during the existence of the primary lesion, while 25 were mercurialized at this period. In those who had not been treated with mercury, symptoms of the condylomatous period developed 43 days after the appearance of the primary lesion, and 49 days afterward in the 25 mercurialized patients.

As regards the intensity of the further course of the disease, there was an almost absolute similarity between the relapses which occurred after more or less prolonged mercurialization, and those which appeared without this treatment, which is assumed to weaken the disease.

In the initial stage of syphilis, therefore, Diday never prescribes mercury unless he is compelled to counteract the disadvantages that may arise from a marked "perichancrous" induration. The latter he regards as the advance sign of severe syphilis. If a roseola appears fifty days after a "chancre parchminé" in a young vigorous individual, and he is in a

position to take proper care of himself, a favorable prognosis may be given concerning the course of the syphilis.

Apprehensions concerning the severity of the disease must be aroused by the following circumstances:

a. A long standing and large primary lesion.

b. A duration of the second incubation less than forty days from the appearance of the primary lesion.

c. Great weakness, despite a good constitution, during the prodromal stage.

d. When the first papular eruption is confluent, and attacks at the same time the chest and back, hairy scalp, palms of the hands, and soles of the feet.

e. When mucous patches appear at the same time as the cutaneous eruptions, without any special accidental and habitual cause, and when they appear at this time in places at which the mucous membrane passes into the skin.

f. When the enlargements of the lymphatic glands in the neck, etc., are abundant and long persisting.

g. When an old, feeble, nervous, lymphatic individual is attacked.

In the first case, the syphilis may sometimes recover under the influence of tonic hygiene without mercury; in the second case, it is well to give mercury, aiding it, at the same time, with tonic remedies. A judgment as regards the important point of the future of both cases will be obtained by the clinician from careful study, especially at the onset, of the later secondary symptoms, which are so variable in their intensity and duration. He will thus be placed in a position to solve this highly important question. In order to determine whether a case will recover spontaneously or whether specifics must be administered, Diday gives the following data: "Do the eruptions follow at short intervals? Do they occur at variable intervals? Do the eruptions appear in regions and at a time, when the hygienic and moral conditions are insufficient to explain their development? Do they occur without previous excesses? Do the mucous patches give rise to enlargement of the lymphatic glands? If there are symptoms which indicate an affection of the nervous system, then we must interfere even if there is only a single lesion and this indicates great intensity of the disease."

Relying upon his experience Diday, says that no results are

to be expected from the administration of mercury if it is given before the appearance of morbid symptoms or during an interval in which the organism is free from symptoms.

H. Zeissl advocated views similar to those of Diday, and we subscribe almost entirely to the opinions advocated by the former writer. Zeissl started from the standpoint that in many cases the remedies employed may have exercised no direct influence on the recovery of the syphilis, and that at least in a large proportion of recoveries which have been credited to the different plans of treatment, the results were due to the help of nature. He adopted the following plan in his clinic. From the patients received in his wards who suffered from the initial syphilitic sclerosis, he selected those who appeared to have a similar constitution, so far as this is at all possible in different individuals.

So long as the initial sclerosis alone was present and no trace of a secondary syphilitic affection was visible, all these patients were treated expectantly, with suitable regimen, the initial sclerosis being treated locally with some dressing to which a disinfectant or astringent property is ascribed, such as aqua calcis, carbolic acid, powdered iodoform, etc. As soon as the secondary symptoms of syphilis had appeared in the form of an eruption, one part of the patients selected were subjected to an inunction cure, iodine preparations were given to another part, and the third series, despite the appearance of secondary syphilitic manifestations, received no medicine or, at the most, a placebo like syrup. rub. idæi or aqua amygdalarum internally or inunctions with a bland ointment such as unguentum simplex or the so-called unguentum citricum (fat, wax and curcuma or some other yellow substance).

H. Zeissl thus found that recent syphilides yielded very rapidly to mercurial inunctions, sometimes even after ten to fourteen inunctions, but that in some cases these syphilides presented no change even after ten applications of unguent. hydrarg. cinereum.

He also found that the secondary forms of syphilis, under the internal administration of iodine, often yielded within fourteen days, often not until four to eight weeks or even later.

Finally, Zeissl also noticed that in those patients who were treated expectantly even after the appearance of secondary

symptoms, the eruption disappeared completely within a period of four weeks to several months, and that in very rare cases the syphilitic eruption disappeared spontaneously two weeks after its onset without any treatment.

These experiments made it possible to study the natural course of syphilis, without any disturbance from the use of drugs; and proved that syphilis is a disease which, despite the apparent regularity of its course, is very often atypical, that it requires sometimes a shorter, sometimes a longer period for its cure, and that it varies in different individuals according to their bodily constitution. Thus, Zeissl observed, for example, that in very anæmic individuals who became syphilitic, an extremely scanty, maculo-papular eruption appeared or that a pustular syphilide developed very rapidly.

He also established the fact that the initial sclerosis is constantly followed by an eruption at the end of six to eight weeks, but that the gummous syphilides rarely develop within less than six to twelve months after infection.[1] These severest forms of syphilis, however, occur much more rarely after expectant treatment, though they do develop occasionally after this as well as after treatment with mercury or iodine. By the expectant plan Zeissl disproved the statement of the antimercurialists that the severer forms of syphilis are produced solely by mercurial treatment. He also made other interesting observations. For example, he found that if mercurial treatment is adopted immediately after the development of secondary symptoms, relapses occur much more frequently and, as a rule, are more obstinate than after the expectant plan or treatment with iodine. The observation was also made that if iodides were given immediately after the appearance of a syphilitic eruption or if no drugs were used and the eruption had not disappeared at the end of four weeks, then a very small number (10 to 12) of inunctions of small quantities

[1] H. Zeissl treated a man of 35 years who at the time of his admission suffered from a sharply defined, gangrenous, initial sclerosis on the prepuce. The initial sclerosis was excised and at the end of twelve weeks a distinct gummous syphilide appeared, particularly upon the face. We have also seen, in a patient in private practice, that gummata appeared upon the general integument and the tongue sixteen weeks after infection. This patient had been subjected to a vigorous inunction cure six weeks after infection.

(2.0) of gray ointment sufficed to destroy the symptoms completely.

Relapses were also observed after the expectant plan, but they occurred much less frequently than when mercury was administered immediately after the outbreak of the first secondary symptoms. H. Zeissl also made the observation that when individuals, after the disappearance of the first eruption without the administration of drugs, were not attacked by fresh eruptions for a year, they could usually be regarded as entirely cured.

He believes that the cure of syphilis can be effected under the expectant plan of treatment, simply because syphilis, like the majority of curable diseases, can recover under suitable regimen, without the administration of drugs. In his wards we have seen syphilitic roseola disappear occasionally within three months and in two cases within two weeks, without any medication. The most obstinate syphilide, the papular (psoriasis palmaris et plantaris), particularly the miliary disseminated papular syphilide, does not disappear, without treatment, in less than two to four months, but often requires a much longer time for complete involution. Syphilitic acne, impetigo, varicella and ecthyma also require a similar period for spontaneous involution. Under the expectant plan the initial sclerosis requires, for complete involution, two months, often four to twelve months or even more.

Zeissl propounded the following views:

It is true that if an individual suffering from an early syphilitic eruption is subjected at once to mercurial treatment,[1] the morbid symptom existing at the time usually disappears very rapidly, but the syphilitic diathesis remains and is manifested particularly by hyperplastic lymphatic glands.

It will be noticed, however, that among one hundred individuals treated in this way, ninety-six on the average will be attacked by relapses sooner or later. In those individuals who have received mercurials internally or hypodermically at the first appearance of a syphilitic eruption, the relapses occur as often as after early inunctions; opaline patches on the mu-

[1] Clinical experience has taught us that the violent and distressing headaches which usually occur during the syphilitic eruptive fever, are relieved by no medication so rapidly as by three or four inunctions of gray ointment (two grammes).

cous membrane of the tongue, mouth and pharynx occur with special frequency after the internal or hypodermic administration of corrosive sublimate.

If we make a resumé of these facts, it appears that mercury, when given in the earliest phases of syphilis, causes very rapid disappearance of the morbid symptoms, but that relapses occur more frequently than after other methods.

The favorable results which may be attributed to mercury are, that it usually causes more rapid disappearance of the symptoms of syphilis than other specifics and that, when it is used two or three months after infection and the disease has had time to exhaust itself somewhat, very small doses (10 to 12 inunctions) suffice to cause the disappearance of the symptoms still present. As a matter of course, it cannot be foretold whether such a recovery is permanent. It is in the treatment of syphilis that less depends upon what is done than upon how and when it is done, and this is particularly true of the administration of mercury. The mercury is not the injurious agent, but the improperly selected period of its administration.

It is only when the expectant method and iodine treatment are unsuccessful that mercury should be used, and we will then find that the patients are not alone restored in a comparatively short period, but permanently, in the large majority of cases.

As regards treatment with iodine, H. Zeissl has found that, if the iodides are given after the first appearance of the syphilitic eruption, the latter disappears in four to six weeks, at the latest in three to four months, and that the iodides are suitable as a remedy in all phases and forms of syphilis. But relapses also appear after their administration; the relapses are observed after early treatment with iodides, but much less frequently than after early treatment with mercury.

When syphilis is treated expectantly, *i.e.*, when an antisyphilitic is not given to the patient after the appearance of the first secondary symptoms, the eruption requires, on the average, a period of two to eight months for its disappearance, while the initial sclerosis requires at least four months, often a year or more for its involution. Defluvium capillorum and enlargement of the glands often remained noticeable for a year; with the return of the growth of the hair the symptoms successively disappeared. Zeissl very rarely observed any

relapses, especially of a severe kind, when purely expectant treatment was continued until complete disappearance of the luetic symptoms. We can confirm this observation from our own experience.

Zeissl thus gave the preference to the expectant plan over the two other methods of treatment. He would have resorted to drugs only in dangerous or severe symptoms, were it not that the patients in private practice often demand rapid relief from the cutaneous affections which sometimes disfigure them, and if the rapid cure of the symptoms were not urgently required in hospitals on account of the great accumulation of patients. Moreover, hospital patients usually belong to the working classes and must be restored as quickly as possible to their work. All these circumstances induced him to proceed more rapidly in hospital cases and to give drugs at an early period. He began with iodine treatment, which stands next to the expectant plan in the infrequency of relapses.

The following was the usual plan of treatment in his clinic:

When a patient suffering from initial sclerosis was received, the treatment at first was local, whether the sclerosis was intact or degenerated.

The iodides were given as soon as a syphilitic eruption was noticed. It was only when the eruption did not yield to a six weeks' treatment with the iodides, that mercury was used, either Zittmann's decoction, inunctions of gray ointment or, in very rare cases, subcutaneous mercurial injections. Twelve to fifteen inunctions usually extinguished the symptoms.

Zeissl formulated his experience in the following dicta:

1. The expectant plan takes a long time to relieve the symptoms, but, in the majority of cases, it cures syphilis permanently. Syphilis relapses very rarely after the expectant plan, much less frequently than after early mercurial treatment.

2. Treatment with iodides is next in efficiency to the expectant plan. The iodides are suitable for all stages and forms of syphilis. Even the severest symptoms, such as iritis, disappear after its proper administration, combined with rational regimen, but much more slowly than after mercurial treatment.

3. When the symptoms do not yield to the expectant plan or to iodides, minimum quantities of mercury (Zittmann's de-

coction or nine to twelve inunctions of two grammes of mercurial ointment) will cause their disappearance.

4. In pregnant women the symptoms of syphilis offer more obstinate resistance than in non-pregnant women, especially if conception and infection occurred at the same time. The secondary symptoms usually do not disappear completely until the patient has been delivered. In such cases the treatment must then be continued with iodides or, if these fail, with a few mercurial inunctions.

It is a noteworthy fact that Sigmund, who has had such a large experience and whom no one will accuse of a prejudice against mercury, expresses himself in the following manner:

"From the data collected there follow, among others, these conclusions, viz., that after local treatment of the first forms of syphilis very slight secondary symptoms (often so slight that they escape the patient's notice) appear in a very considerable proportion (forty per cent) of the cases; that in addition there is another notable proportion (about ten per cent) in which there are only brief and slight affections of the skin and pharyngeal mucous membrane (erythema, papules) which disappear rapidly under suitable local measures without general antisyphilitic treatment and, at the same time, without any disturbance of the nutrition and general condition of the patient; finally, that the number of severe secondary affections after such an expectant plan is not greater than after early antisyphilitic treatment, but that, on the contrary, experience favors the opposite view." Sigmund says further: "After long-continued comparative trials of both methods of treatment, it becomes evident that general antisyphilitic treatment, when begun in the later period, effects more rapid and thorough results than early treatment which must be continued longer and must often be repeated. . . . Science and experience positively favor the view that the proper time for general antisyphilitic treatment is in the second stage of the development of syphilis and that even at this period it should only be begun on the condition that several systems and organs are attacked, or if only one of them presents severe forms, or finally if the nutrition and vigor of the organism are demonstrably impaired by syphilis. In affections of mild grades and in certain organs, suitable local treatment will suffice even during the second period of the disease." Sig-

mund declares that hygienic-dietetic measures and the consideration or treatment of other complicating constitutional diseases are indispensable in every stage and form of the disease. He chooses the remedy to be employed in the general treatment of syphilis according to the form of the disease and the individuality of the patient. He concedes the efficacy of iodine even in the papular stages.

Whether and when mercury should be given constituted the main question in the therapeutics of syphilis almost to the end of the seventies in the present century. Although no agreement has been reached concerning the period at which this treatment should begin, the use of mercury was very materially restricted, at least in Vienna, while its value as a curative agent was fully recognized. The question as to the beginning of mercurial treatment still remains sub judice, but two other points in treatment have become more prominent. These questions are: *a*. Shall syphilis be treated when the primary lesion alone is present? *b*. How long shall treatment of syphilis be continued?

The first question must be considered from two standpoints. 1. Can the cauterization of erosions after suspicious intercourse prevent the development of a syphilitic primary lesion; or if a distinct primary lesion is present, can its excision prevent the spread of the virus to the general organism? 2. Can this object be attained by antisyphilitic treatment; or, if we are not in a position to destroy the virus of syphilis by the earliest possible treatment, can we at least diminish its deleterious influence on the organism? This treatment is called preventive general treatment.

We will now consider the first point: 1. Since syphilis has been better known, attempts have constantly been made to find a remedy which offers protection against the reception of the virus and which makes the virus inert after its reception.

Charlatanry has extolled many agents for this purpose, but none has proved successful. The condom offers the comparatively greatest protection. If there is a suspicion that the syphilitic virus may have entered at any part of the general integument or mucous membrane, the prevention of further results can only be effected by those measures which are used against other deleterious infecting substances (virus of glanders, hydrophobia, and chancroid). We most attempt to destroy

the virus and the tissues affected by it, by means of deeply spreading caustics. We have been taught by countless experiments on chancroid virus that it can be made innocuous to the organism if its site of reception is thoroughly destroyed within three days after inoculation. But the period within which the syphilitic virus can be destroyed by cauterization has not been ascertained by similar experiments. Inasmuch as it may be supposed that among so many excoriations after coitus, in which cauterization at the third day proved successful, the syphilitic virus may have acted occasionally, it might be hoped that it would be possible to destroy the syphilitic virus by cauterization and to render it innocuous within a few hours after inoculation. Years ago, Sigmund vigorously cauterized all points of venereal infection which came under his observation within a certain period, in the hope of protecting some individuals against syphilis. Although a number of these individuals became syphilitic, despite cauterization between the first and third days, Sigmund did not regard his experiment as useless, because the proportion of individuals who became syphilitic to those suffering from venereal diseases in general, was less when cauterization was performed than when it was dispensed with.

Caustic potash, Vienna paste, but preferably concentrated carbolic acid may be used for such cauterizations. Carbolic acid is preferable to nitrate of silver because the latter does not act so deeply and also forms a scurf which prevents accurate observation and retains the pus. Neisser also recommends concentrated carbolic acid. But we are rarely in the position to carry out these cauterizations for the prevention of syphilis because the patients usually do not notice the infection until a longer time after the infecting intercourse and until the product of the general disease, the primary sclerosis, is present. The cauterization cannot be performed with any great hope of success because Sigmund found that syphilis could not be prevented in a number of cases despite vigorous cauterization within one to three days after infection. We have repeatedly seen, in the course of our practice, that the initial syphilitic sclerosis with all its sequelæ developed in cases in which, according to the statements of physicians and patients who were worthy of belief, the cauterization was performed a few hours after the suspicious coitus. If syphilis does not

follow cauterization, which was performed within one to three days after the suspicious intercourse, we may not draw too positive conclusions concerning the efficiency of the treatment, because we do not know that syphilitic virus has really been destroyed by the cauterization. We possess no data which will inform us whether—even if we know that the infecting person is syphilitic—the individual who has had sexual intercourse with the former has really been inoculated with the syphilitic virus. This we can only learn after we possess more accurate knowledge concerning the syphilitic virus. But as such cauterizations can produce no bad results, it will not be improper, in suitable cases, to cauterize excoriations which are discovered within a few days after suspicious intercourse.

The second question is, What shall be done when a syphilitic primary lesion is diagnosed? Shall it be excised or shall general treatment be inaugurated at once?

As regards the removal of the primary lesion a favorable result from its excision will be expected only by those who regard it as a local morbid product, from which the infection of the general organism follows. We subscribe to the opinion that this lesion itself is the expression of general infection. Despite this opinion we have performed excision in a few cases without expecting any results. We were impelled to carry out this plan because positive results would have compelled us to change our opinion concerning the significance of the primary syphilitic lesion. In these cases (there were thirteen in all) multiple enlargement of the inguinal glands was present twelve times on the first appearance of the patient. In only one case there was no enlargement of the inguinal glands, and the ulcer, which was situated in the retro-glandular sulcus, was as hard as cartilage. In all thirteen cases a distinct syphilitic eruption appeared after a longer or shorter period. In two cases the cicatrix became indurated. As all these patients were seen in private practice, I have had them under observation for several years. I am able to say with regard to them that in not a single case could I notice that the excision weakened the course of the syphilis.

The experience and statements of the different authors who have written on this subject are very conflicting. This was shown clearly at the Eighth International Medical Congress at Copenhagen. We will here mention a few of the most weighty

statements. Wilks states that the results obtained by a commission appointed to study the subject of excision, showed that such a plan is useless. He mentioned that in the Dreadnaught Marine Hospital there could long be seen a jugful of chancres collected by one of the surgeons and then exhibited as proof of the uselessness of excision. Sigmund and Ricord also obtained negative results. Ricord says that the induration should be regarded, not as the cause, but as the result of the constitutional affection, and has recently spoken in decided terms against excision, in opposition to Leloir. He states that he has entirely abandoned cauterization or excision of the initial lesion, and regards its destruction at any time as absolutely useless. Syphilis exists as soon as the primary sore has appeared or even prior to its appearance. The outbreak of the disease would occur even if the penis were amputated on the appearance of the initial lesion.

Various authors have returned to this question in recent years and mention that they have obtained favorable results from the excision of the primary lesion. These results are said to consist of the absence of the secondary symptoms. Auspitz and Unna deserve the credit of bringing this question into thorough discussion. Among those writers who claim favorable results we may mention: Auspitz and Unna, Koelliker, Hueter, Chadynski, Ferrari, Schiff, Bumm, Pick and Vogt. Neisser declared himself, in Copenhagen, a firm adherent of the excision method. This method is opposed by H. Zeissl, Fournier, Lewin, Martineau and others. Mauriac, Leloir and J. Neumann obtained only negative results. Vajda has had no favorable results, and Bergh, of Copenhagen, puts no faith in excision. Its value must appear especially problematical when we remember that negative results were obtained in those cases in which excision was performed under remarkably favorable conditions.

Thus, Mauriac observed the development of syphilis in a case in which he performed excision fifty hours after the appearance of the primary lesion, although there was no enlargement of the inguinal glands at the time. This also happened to Leloir who performed excision in the foreskin fourteen hours after the development of the sore and twenty-two days after the suspicious intercourse. Undoubted secondary symptoms appeared six weeks after the operation. Fournier

observed a similar case. Suspicions concerning the value of excision must also be aroused by Angerer's case. On April 4th, 1880, eight weeks after infection, he excised an initial sclerosis which was accompanied by moderate enlargement of the glands. The patient presented no symptoms of syphilis; but his wife, whom he married Oct. 7th, 1880, aborted in the sixth month on April 24th, 1881; the child and placenta were not examined. The husband was subjected to inunction treatment with 100 gm. ung. cinereum and took 35 gm. potassium iodide. On April 16th, 1882, the wife again aborted in the seventh month of pregnancy. The mother and child exhibited evidences of syphilis.

Auspitz, who believed in the non-infectiousness of the buboes of the primary lesions, did not regard their existence as a contra-indication to excision. Th. Koelliker also says that the scleradenitis does not necessarily exclude the success of excision. Chadynski claims to have observed that syphilis did not develop despite the presence of adenitis. Folinea expresses a similar opinion, but says that general infection is more apt to occur when polyadenitis is present. Pick and Spillman observed no favorable results when the operation was performed in cases in which the adjacent lymphatic apparatus was affected. Bumm had an almost identical experience.

Bumm notably advanced the question of excision. He inoculated a healthy individual with the milky serum from two inguinal glands which had become swollen immediately after the primary lesion. After the development of a primary syphilitic lesion the individual exhibited a maculo-papular syphilide fifty-two days after the inoculation. This experiment led to the conviction that, if a favorable result is to be obtained, the operation must either be performed before the lymphatic apparatus adjacent to the sclerosis is diseased, or the glands must also be removed. If the operation is performed prior to implication of the glands adjacent to the initial lesion, we cannot be certain that a syphilitic sore really has been extirpated. In order to make a positive diagnosis, the long incubation, the moderate secretion, the indolent glandular enlargements, and the almost constant induration of the primary lesion must be taken into consideration. If excision is performed at a time when there are no indolent enlargements of the glands, such cases, if secondary symptoms do not ap-

pear, will be so much less convincing, because numerous excisions, performed under similar favorable circumstances by Pick, Mauriac, Fournier, Leloir, Keyes and others, have been useless as regards abortive treatment. On the other hand, the adherents of excision can claim, in regard to such cases, that we do not know the character of the extirpated part and that the syphilitic virus may have entered at another locality. Such claims may be made the more readily because microscopical examination of the early stage of a primary syphilitic lesion furnishes no absolutely certain means of recognition. But even if we advocate the view that the primary sore and the adjacent indolent buboes are not the expression of general infection of the organism, we may not place too strong hopes in the final result of extirpation of the glands when performed at the same time as excision of the sclerosis. Fournier had the opportunity of performing three autopsies upon individuals suffering from the primary lesion, and who had died of an intercurrent disease. From these autopsies it follows that the glands are attacked at the end of the first week (six to nine days) after the appearance of the primary lesion, and that, when the primary lesion is situated on the genitalia, the glands are diseased not alone in the inguinal region, but also in the iliac fossa and pelvis.

Hence the incentive to excision of the sclerosis and the adjacent lymphatic apparatus is so much less, because the coincident extirpation of the glands makes the operation quite a notable one. Moreover, the results of such operation have been very vacillating and the positive results are still open to criticism. At all events it is a noteworthy fact that the majority of syphilidologists who report favorable results, adhere to the unicist theory. The extent to which opinions still diverge and the absence of agreement on this point are best shown by a resumé of the views of a few writers.

Thus, Pick made the following statements at the Congress in Copenhagen: "The excision of the initial sclerosis is adapted, under certain rare conditions, to prevent infection of the general organism by the syphilitic virus. The most important result of the experiments in excision is the proof which they have furnished that the initial sclerosis constitutes only the local action of the virus, not the expression of the general disease, that the virus usually spreads from the initial lesion

through the lymphatics, and that there is therefore hope of reaching the virus in this path and making it innocuous."

J. Neumann writes: "As appears from these four experiments, we are unable to prevent general infection even by early extirpation of the sclerosis and lymphatic glands. The reception of the syphilitic virus by the blood is not even prevented by combining systematic antisyphilitic treatment. Nor could weakening of the constitutional disease be observed in any case."

Neisser expresses himself in the following way: "Even if some of the published cures are excluded on account of doubtful diagnosis, a certain number of excisions with positive results remain and appear to us to be convincing. Hence follows the conclusion that there is a possibility of treating syphilis radically by excision, of eradicating it at the very onset, although, as I willingly admit, the probability of effecting this end is comparatively slight and the degree of such possibility cannot be predicted in the individual case."

At a meeting of the Academy of Medicine held Nov. 9th, 1886, Cornil made a report on a paper entitled "précises par une série d'observations s'il existe un traitement abortif de la syphilis confirmé." He says: "The writer has collected 454 cases, of which 105 were successful, 339 unsuccessful. But in the cases described as successful the diagnosis of a syphilitic primary lesion had either not been made or could not be made, or the patients had not been under observation sufficiently long. The criticism made by the writer of this brochure upon the larger proportion of the cases, shows that some must be accepted with the greatest reserve and that the others cannot withstand criticism. The radical cure of syphilis by excision of the primary lesion must be declared perfectly useless and may even become dangerous if it is instrumental in preventing mercurial treatment." Cornil declares that the brochure decides the question on account of the value of the criticism and the large number of cases analyzed.

It must be acknowledged that statistics decide against the method in question. Cases such as those of Mauriac, Leloir and Fournier, and the fact that weighty objections may be offered even to the favorable cases, lead us to doubt the results of abortive treatment and to state that, if there is a period of incubation in syphilis, it is very brief and that ex-

cision of the primary lesion does not prevent the development of constitutional syphilis, whether the adjacent lymphatic glands are swollen or not at the time of excision. We consider excision indicated only in so far as it rapidly removes a morbid focus which disappears slowly under general treatment. In addition, individuals in whom the secondary symptoms have disappeared while the primary lesion still exists, may be discharged more quickly from hospital treatment if the primary sore is excised. Perhaps more accurate, to be hoped for knowledge of the syphilitic virus will furnish the possibility for successful abortive treatment of syphilis.

We will briefly mention that the interruption or removal of the paths of absorption has been suggested and is also said to have been employed in order to prevent general infection. At the Medical Congress in Wiesbaden, 1886, Kaposi opposed this method. As little may be expected from the plan, practised by some writers, of destroying the virus of syphilis in the lymphatic tracts by injections of mercurial or iodine preparations into and around the glands nearest to the primary lesion. Lipp and others have employed this method. For example, Weissflog recommended injections of red oxide of mercury every ten to twelve days between the situation of the primary lesion and the groin. In several cases G. Lewin injected a weak solution of corrosive sublimate subcutaneously into the initial sclerosis of patients who did not yet exhibit general symptoms. Similar injections were made at the same time into the vicinity of the lymphatic glands. In two cases Lewin observed relapses, but the period which has elapsed since the beginning of these experiments is still too short to expect positive results.

We will now enter upon the discussion of the second point, viz., preventive general treatment. Here the opinions differ widely and we find prominent syphilographers of large experience among the adherents and opponents of this method.

Among the former we may mention Mauriac, Fournier, Jullien, Hutchinson, Cazenave, Drysdale, Ricord, Michaelis, Leube, Edlefsen, Baeumler, and Weber. Neisser who considers it still an open question whether general treatment shall be begun immediately after the assumed diagnosis of the initial lesion or not until the appearance of general symptoms, seems to favor preventive general treatment. Among the opponents of this method are H. Zeissl, Sigmund, Hebra, Kaposi, J.

Neumann, Baerensprung, Doutrelepont, Diday, Liebermeister, Sturgis, Rinecker, Bockhart, Finger, Bassereau, Lesser, Koebner, etc. Baeumler speaks in favor of the plan in the following words: "Preventive treatment, before secondary symptoms have appeared, is decidedly advisable for the reason that in the interval we can destroy a number of elements of the virus which would have given rise to as many primary affections in all possible tissues."

The opinions of the advocates of preventive general treatment is based upon the notion that mercury is an antidote of the syphilitic virus. This notion, however, is not founded on any known data. We only know that the symptoms of syphilis disappear upon the administration of mercury and the iodides, but whether these preparations really destroy the syphilitic virus or merely place the organism in a position to wage a more successful struggle against it, is an open question. Such reasoning would force us to conclude that mercury is also an antidote to cadaveric or gonorrhœal poison, because it also causes disappearance of the inflammations of the lymphatic vessels induced by these poisons. Whether mercury and iodides are really antidotes of the syphilitic virus will only be known when we are able to make pure cultures of the supposed micro-organism of syphilis and to study the action of these preparations upon them.

It is at least a striking fact that men of large experience, such as Hebra, Sigmund and H. Zeissl, who had practised preventive general treatment for so long a time, finally discarded it. In 1850 H. Zeissl expressed himself as follows: "As we have said above, the individual is constitutionally diseased from the moment at which the chancre indurates. It therefore requires absolutely general treatment which, when carried out properly, finally causes entire absorption of the Hunterian chancre." At that time Zeissl recommended corrosive sublimate for general treatment.

Kaposi says that "whenever he has been led astray by logic or external circumstances to adopt general treatment before the outbreak of the eruption, he has been sorry for it." He corroborates the experience often made by others and by ourselves that early treatment does not prevent the appearance of the general symptoms, but only delays them; that the symptoms appear irregularly and that mild eruptions no

longer occur exclusively, but there may be very early severe symptoms. Not alone is the development of severe symptoms, especially those affecting the central nervous system, accelerated, but in the rare cases in which severe early symptoms remain absent, injury accrues to the patient in so far as the syphilis runs a much slower course than when no early treatment has been adopted. Doutrelepont likewise states that he has not obtained any good results from preventive treatment. "Sometimes very disagreeable, gummous forms appeared, although the milder secondary symptoms had remained absent."

J. Neumann states that this plan is incapable of extinguishing syphilis at the root, but that it changes the localization. While cutaneous eruptions and enlargement of the glands predominate when there have been no preventive inunctions, after the latter we find that the mucous membrane of the mouth and pharynx, especially the lips and tongue, are particularly apt to present patches, despite the utmost care devoted to the mouth.

Koebner reminds us that, until the sixties of this century, no other method was known and practised that than of general treatment on the appearance of the indurated chancre. During his entire practice he has seen only two cases in which the outbreak of general symptoms apparently was entirely prevented. In all other cases syphilis ran its course despite even forced inunction treatment during the primary period; at the most the symptoms are somewhat delayed and abnormal. Unfortunately we have had repeated opportunity of noticing that those individuals, who received inunctions immediately after the diagnosis of the primary lesion or after the appearance of the first eruption, exhibited disproportionately early severe and fatal symptoms on the part of the central nervous system.

Jullien also calls attention to the unfavorable influence exerted by mercurial treatment on the nervous system, while Guentz attributes to it the development of albuminuria, nephritis and fatty degeneration, especially of the kidneys. But we must here consider another circumstance. We have convinced ourselves repeatedly that severe symptoms, affecting particularly the viscera, occurred in those syphilities in whom the first eruption was very scanty, in whom the cutaneous

symptoms in general were slight, while those in whom the cutaneous symptoms were severe and extensive from the start, were attacked much less frequently by relapses, particularly by severe symptoms.

Baerensprung reports exactly similar experiences. He says: "Careful observers will not fail to have noticed the fact, which I have constantly confirmed for years, that patients in whom syphilis is manifested at the start by abundant eruptions, have less to fear afterward than those in whom the first symptoms were rapidly suppressed by mercury, while the disease was not cured, but merely made latent. I have seen the most severe and rapid destructions almost always in those cases in which inunctions were used against the primary or first secondary lesions."

These observations, made by Baerensprung, Doutrelepont, H. Zeissl and myself, would perhaps force us to the hypothetical assumption that the cure of syphilis is so much more easy and permanent, the greater the surface of the skin over which is spread the virus (which is contained, as inoculation experiments show, in every eruption). Perhaps the fact that the supposed micro-organisms of syphilis reach the cutaneous surface in large numbers places them under conditions which are unfavorable to their further existence and proliferation, and causes their extensive destruction without the intervention of treatment. It is not astonishing that complete harmony as regards preventive treatment and the treatment of syphilis in general cannot be secured, when we see one authority opposed to another. But it must cause surprise that in the therapeutics of syphilis writers remain deaf to the teachings of history. History clearly teaches that syphilitic patients did better when the use of mercury was lessened.

From our own experience with preventive general treatment we are decidedly opposed to it. The only result of this form of treatment with mercury is to delay somewhat the outbreak of general symptoms. Diday furnishes the statistics of 74 patients on this point: 49 had not, 25 had used mercury during the existence of the primary lesion. In the former the general symptoms appeared, on the average, $43\frac{23}{100}$ days, in the latter $49\frac{8}{100}$ days after the development of the primary lesion. Among the former the syphilis was feeble 17 times, moderately severe 27 times, severe 5 times; among the latter

it was feeble 6 times, moderately severe 14 times, severe 5 times. As a compensation for the few days' delay in the outbreak of the general symptoms, these run an irregular course and severe forms occur early. A further disadvantage of mercurial preventive treatment is the fact that the syphilis becomes more obstinate in so far as the symptoms of the condylomatous period yield much more slowly than if mercury has not been used until the appearance of this stage. We have therefore achieved nothing by preventive treatment except to weaken our chief weapon against syphilis.

We will now consider the second principal point, viz., how long should the treatment of syphilis be continued.

The fact that, whatever the plan of treatment, relapses may occur or such individuals may beget children who suffer from hereditary syphilis, proves that the relief of the symptoms does not always abolish the syphilitic diathesis. The question then arose, Shall the treatment cease with the disappearance of the symptoms and be begun again only when the symptoms return, or shall it be continued for a long time even if no symptoms are present? The latter method was developed particularly by Fournier, who gained many adherents in France and Germany.

As Caspary, who is an opponent of the chronic plan of treatment, showed, Fournier started with the belief that cases of syphilis, which are treated insufficiently or not at all, always lead to severe tertiary forms. But Caspary justly maintains that this assumption is false and is opposed to the experience of old physicians. Although not as ripe in experience as Caspary, we can confirm his statement. It is not true that all non-treated cases result in tertiary forms. We are acquainted with a number of patients who were treated by H. Zeissl on the expectant plan, are perfectly well at the present time, and have produced healthy children. Diday, who vigorously opposes Fournier's views, makes the following grouping of the changes in Fournier's therapeutic opinions since 1858. In 1858 he recommended six months' mercurial treatment, then three months of the iodides. In 1873 the successive intermittent method is recommended; 1, two months mercury; 2, then, no matter what happens, no mercury for a month; 3, then two months mercury, whether the patient presents symptoms or not; 4, three months without mercury; 5, two months

mercury, and so on for two years. In 1879 followed the continuous alternating method; eight weeks inunctions and iodides, then four weeks rest in order that the organism becomes weaned from the drugs, then six to eight weeks mercury, four to five months rest, four to five weeks mercury, and so on for about two and a half years. In 1880 Fournier required the treatment to be continued methodically and vigorously for three to four years, and Martineau wishes it to be continued even five years. According to Caspary, Denis Dumond pleads for the unlimited continuation of treatment.

Neisser is probably the most vigorous adherent of Fournier in Germany. He agrees entirely with him both as regards the mode of treatment and the duration as expressed in the statement: "The treatment should be chronic (two to four years) and should be carried out irrespective of the presence or absence of symptoms." He accepts this doctrine absolutely with all its consequences and regards chronic mercurial treatment as innocuous, and intermittent treatment as advisable. He differs with Fournier in so far as the latter recommends the prolonged administration of moderate doses (usually the feeble, uncertain protiodide internally), while Neisser insists upon a change from active, so-called main cures to milder, so-called auxiliary cures, in order that a large amount of mercury may be introduced and accumulate in the organism in a comparatively short time. The first cure should be especially vigorous and, if practicable, should consist of inunctions; these are regarded by Neisser as co-ordinate with calomel injections. Such a vigorous main cure should be repeated in the second, third and fourth years, even if all symptoms remain absent. In addition, in the first two years a mild auxiliary cure should be carried out with mild mercurials which possess the property of passing rapidly through the body. As a matter of course, local treatment is indispensable, and the use of baths, waters and sweat cures is also advisable. Despite his advocacy of this forced treatment, the writer lays special stress on sufficient intervals between the cures and attributes the occurrence of unusually severe symptoms to an excess of mercurial treatment. He naturally gives no rules for protracted treatment which hold good generally, because the physician must always individualize and must act according to the special properties of the preparation employed.

Bockhart and Finger also advocate the chronic treatment of syphilis. But Finger follows the therapeutic views of H. Zeissl, inasmuch as he allows the symptoms of the condylomatous period to undergo resolution, iodine being used when necessary, and only gives mercury when he cannot attain his purpose by other means. He does not regard mercury as a necessary antidote, hopes that all cases may run a spontaneous course, but nevertheless recommends small quantities of mercury repeatedly for two years.

In 1884 we stated that we thought it advisable not to discontinue the treatment of syphilis with the disappearance of symptoms, but to continue it as long as possible, at least a year, iodine being employed for the purpose. If no manifest symptoms of syphilis are present during this time, we order ten to twelve inunctions if the patients have special faith in mercurial preparations. We then stated that it was hardly advisable to administer mercurial preparations for a long time, say four to five years.

Kaposi says that "the more vigorous and persistent the treatment during the first acute period of the disease, the more certainly relapses and a protracted course are prevented." For this purpose he recommends inunctions, and, if these are impracticable, injections of mercurial preparations which have a permanent action. Kaposi says further: "The first treatment should be continued sufficiently long and carefully. The treatment should be repeated as often as real, *i.e.*, characteristic symptoms of syphilis appear (affections of the skin and mucous membranes, enlargement of the glands, etc.), but only under such circumstances. If there are no signs of syphilis, I regard treatment as superfluous. Why fight against wind-mills? Rational treatment, however, cannot harm otherwise healthy individuals, so that I am not opposed on principle to occasional repetition of treatment during the first year."

"In this respect J. Neumann's histological demonstration of cellular infiltration around the finest capillaries, which was found for months after a papule in that locality had disappeared, perhaps furnishes a reason for repetition of the treatment. But the action of mercurials also continues for months, so that every proper mercurial treatment thus becomes a protracted one and will exercise a curative influence on any

syphilitic tissues changes which may be present, even if invisible."

In 1884, Caspary opposed Neisser's views and regards the forced use of mercury as a not indifferent matter. While the cautious administration of mercury during existing symptoms of syphilis is invaluable, its action in latent conditions is uncontrollable. Caspary often observed severe relapses and affections of the central nervous system in patients who had received vigorous treatment. As it may be assumed that the syphilitic virus is incapsulated, so to speak, during the period of latency, we are so much more in the dark in administering treatment at this time, because we possess no criterion of the necessary amount of the drug administered. Caspary closes with the words: "A hundred cases of syphilis—a drop in the ocean; in addition their classification as regards treatment is purely accidental. I therefore forbear drawing any further conclusions. I need not emphasize particularly that I do not consider the results of my treatment as the best conceivable, that I desire nothing more fervently than to be taught and corrected by the better results of others. But those who have been treated according to Fournier's plan must have been under observation for a number of years and have remained free from symptoms. Despite statements to the contrary, I do not doubt that vigorous treatment at the onset delays relapses and I have already expressed the fear, based upon experience, that such relapses are apt to be especially severe."

In 1882, Sigmund wrote: "I have not opposed the occasional repetition of the treatment of syphilis with specific remedies, but that plan of treatment for which there are no well-founded indications, *i.e.*, the administration of remedies despite the absence of evidences of syphilis—a battle against a merely suspected, dreaded but invisible foe, who cannot be properly judged. Relapses, new forms of development of syphilis appear. These should be carefully scrutinized individually and then treated. Such a course offers a certain lever for the cure of the disease. Surely a more rational and humane method than that of the opposite party."

We thus see one authority opposed to another concerning the question of the duration of treatment. Perhaps the collective investigations now prevalent will further the solution of the question. For the present we will permit ourselves to

make a few remarks concerning continued treatment. Are its results really so brilliant? To this there can only be one answer, viz., no opinion can yet be formed. The method of treatment suggested by Fournier has been practised much too short a time. When a large number of patients, who can be compared with the number of those treated according to the symptomatic method, has been treated in this way and has been observed for fifteen years or more, then a final opinion is allowable. But to decide now in favor of the mercurial treatment which has been practised for years would be rash. From what we have learned from our own experience, the results would not be so very favorable. We believe, on the contrary, that Caspary's view, mentioned above, would prove correct. The fact that this syphilographer, who has had such a large experience, agrees with Diday, Sigmund and H. Zeissl, lends his opinion still greater weight. In accordance with our therapeutic views, we ourselves, urged by the patients, have adopted the continued alternating plan of treatment in only two cases. The results were unfavorable. The adherents of Fournier might interpose that both these patients were not treated during the existence of the primary lesion. I here give the history of these two cases.

H. K., æt. 22 years, an official, was supposed to have been infected September 30th, 1880, and on November 6th, when he came under my care, exhibited a characteristic primary sore. The patient was first treated expectantly, even for four weeks after a moderately severe maculo-papular syphilide appeared. Then potassium iodide was given four weeks and after the eruption had nearly disappeared, thirty inunctions āā 2.0 were made. From April to October, 1881, potassium iodide was given almost uninterruptedly. In this month a few papules appeared on the mucous membrane of the cheeks and tongue. Twenty-five inunctions āā 3.0 were made, and the potassium iodide contined until March, 1882. Then the patient took Zittmann's decoction for three months, and potassium iodide from June to October. A few papules appeared on the scrotum and mucous membrane of the tongue; twenty-five inunctions. From November, 1882, to May, 1887, the patient exhibited no evidences of syphilis. Every year, until November, 1885, forty inunctions āā 2.5 were made and the potassium iodide discontinued only when iodism appeared. Zittmann's decoction was

once given forty days, and hydrarg. tannic. oxydulat. thirty days as an auxiliary cure. At the urgent request of the hypochondriacal patient ten inunctions āā 2.0 were made in December, 1886. In February, 1887, ten inunctions āā 2.0 and potassium iodide almost uninterruptedly. In June, 1887, an apoplectiform attack occurred and the patient is still under treatment.

The second case differs from the first in so far as the patient was treated four years, but received no medication during the fifth year. Six years after infection—no relapse had appeared for four years—he decided on matrimony, first taking, as a matter of precaution, thirty inunctions āā 2.0 and potassium iodide for three months. Nevertheless the wife aborted in the fifth month of pregnancy, during the first year after marriage, and three weeks after delivery exhibited an extensive, small macular syphilide. No primary lesion was ever observed in the woman. Man and wife have since been subjected to antisyphilitic treatment and have passed out of our observation. We are convinced that with the more frequent employment of Fournier's method the reports of its ill success will not be wanting. It is difficult to see how the protracted use of mercury during the period of latency should furnish such good results, when it is unable to prevent the occurrence of relapses and the latter are continually recurring during the treatment.

Still another point remains to be considered with regard to mercurial treatment continued for many years. Is it really a matter of indifference whether a remedy, which often impairs the nutrition of the patient decidedly, is administered for four or five years? How unfavorably mercury acts on feeble organisms, especially on tuberculosis, could be seen when the attempt was made to treat tuberculosis with injections of corrosive sublimate. Hiller expresses the following opinion on this subject: "This is not a matter of indifference, particularly in doubtful cases of syphilis, because all antisyphilitic medication is known, as a matter of experience, to have a more or less depressing action. This is true particularly of the use of mercury, whether in the form of inunctions or subcutaneous injections, which always presupposes a certain degree of resistance and a good condition of nutrition on the part of the patient, but is poorly tolerated by feeble individ-

uals." Hiller reports forty-four therapeutic (antiparasitic) experiments in phthisis. "Extensive trial was made in forty-four cases with corrosive sublimate, partly subcutaneously, partly in the form of inhalations, partly by parenchymatous injections into the diseased lung. Among these patients the treatment could be completed (forty injections) in only one-half; in the other half it became necessary to discontinue treatment after three to twenty injections because the corrosive sublimate produced all sorts of disagreeable incidental effects or accelerated the loss of strength. In addition to stomatitis and salivation, the treatment had to be abandoned frequently on account of digestive disturbances, viz., anorexia, bad taste, diarrhœa; also muscular tremor, general weakness and insomnia. In advanced cases of phthisis, especially when the patients were confined constantly in bed and suffered from fever, the corrosive sublimate was very injurious. It increased the loss of strength and, as I convinced myself in several cases, accelerated not a little the fatal termination of the disease."

Unna believes that "the so-called syphilitic strictures of the rectum are to be placed in the same rank with the frequent affections of the gums and the rarer dysenteric attacks during mercurial treatment. Rectal ulcers, resulting not from syphilis but from mercury, are probably the cause of these strictures. The direct and remote effects of mercury are the results of reduction produced by the metallic, insufficiently oxidized mercury; the softening, ulceration and suppuration occur particularly in places where other reducing processes are also present, as in the mouth and rectum, where micro-organisms find abundant nourishment on account of bad teeth and coprostasis." These remarks are, at all events, worthy of note and, if proven correct, would show a hitherto unsuspected and dangerous action of mercury on the tissues. In addition we desire to add the following remarks. It is not advisable to employ gray ointment in large doses and irrespective of a beginning violent salivation, even in severe cerebral symptoms. Very sick individuals, who cannot take abundant food, usually run down very rapidly under mercurial treatment and often diminish very quickly in weight. In syphilities who walked poorly, on account of the cerebral syphilis itself, we often found that they were hardly able to

stand after several inunctions. In some of these patients diarrhœa set in after the use of gray ointment, disappeared without treatment after the discontinuance of the mercury, and reappeared as soon as it was again administered.

The symptoms of progressive paralysis in syphilitics often appear to make more rapid progress under forced treatment with mercury and potassium iodide.

Rumpf reports as follows concerning his experience: "There are, however, isolated cases of cerebral syphilis in which mercury seems to exert an injurious influence. At least, in a few cases of mild delirium, its use was followed unexpectedly by stupor and this soon yielded to the administration of iodides. This phenomenon is still unexplained, but should not be neglected in treatment." Rumpf further states that mercury and iodides usually fail in feeble individuals, especially in hereditary syphilis of the nervous system.

When one has had experiences similar to those reported by myself and Rumpf, must not a dread of long protracted mercurial treatment be aroused? Is this not particularly true when Neisser, who battles so vigorously for chronic treatment (Fournier's successive intermittent treatment), says: "Mercury is powerless against such a large number of bacteria and, on the other hand, impairs the organism which has already been attacked by the syphilitic virus." He further says: "From all this the conception of malignity as the characteristic peculiarity of these syphilides follows of itself." We must accordingly abandon treatment with mercury in those very cases in which severe symptoms are to be treated—in which the disease is malignant—and must make our way with other remedies, such as the iodides or simple tonics. Is this not an indication that mercury should not be abused and that it should only be given when we absolutely need it? Is mercury injurious only in malignant syphilis and is its administration for almost five years a matter of indifference in latent or mild syphilis? We should bear in mind what Hoelder says of Torella: "In this respect the statements of Torella (1497) are interesting. He says that by his simple treatment he succeeds in curing the terrible disease quite rapidly and surely. He is astonished that so many patients are not alone cured, but even protected against relapses by his method, which, apart from strict diet, consists mainly of the laxative action secured by manna, tamarinds, and senna with aromatic substances."

We cannot refrain from quoting the apt remarks of Hoelder: "There is no doubt that its misuse aggravates the disease. The objections were really urged against the abuse of the remedy, not against the remedy itself. But as always happens, the exaggerations were attributed to the mercury itself, while the physicians should have reproached themselves. Because it helps in most secondary symptoms, it was expected to cure all forms of syphilis; when this failed, its use was increased and then the remedy was abandoned on account of its abuse. How often will this abandonment of mercury recur in the course of time? If we overlook the entire development of the pathology and therapeutics of syphilis, two points appear especially striking: in the first place, how slight was the influence exerted upon it by the various medical systems, how everything necessarily was subordinated to the conception of the virus, and in the second place how, in the main, all theories and fantastic notions were shipwrecked by the treatment."

These few hints suffice to show that long protracted mercurial treatment is not an indifferent matter to the general nutrition, and that it is hardly conscientious to expose a not perfecly vigorous and intact organism to heroic treatment on account of a perhaps still existing disease. We will give the following brief summary of our views on the most suitable treatment of syphilis.

Like every disease, syphilis may recover spontaneously after a longer or shorter period without the action of any drug. When this natural recovery occurs, it is often permanent. Permitting the disease to run its spontaneous course, with suitable regulation of the diet, is called the hygienic or expectant plan of treatment. Syphilis may also be treated with mercury, the iodides and vegetable remedies. There is no doubt that, in the majority of cases, mercury causes the most rapid disappearance of the syphilis, but it is equally certain that, if mercury is given very early, *i.e.*, on the appearance of the primary lesion or the first eruption, while the symptoms temporarily present disappear very rapidly, much more frequent and obstinate relapses occur than when the syphilis is first permitted to expend its fury. In other words, when mercury is given early, it is as little able as the expectant or iodide treatment, to destroy the syphilitic diathesis in a short time and even delays the occurrence of

complete recovery. In our opinion, mercury should be administered, at the earliest, eight to ten weeks after the appearance of the first eruption, when the latter yields too slowly to the expectant plan or to iodides, or when dangerous symptoms appear on the part of the organs of special sense, the viscera, or the central nervous system. We adhere to H. Zeissl's opinion, "mercury is not the injurious element, but the improperly selected period at which it is used against syphilis."

The following is, in brief, our mode of procedure in the treatment of syphilis.

When a patient is suffering from an initial lesion and we can find no evidences of constitutional syphilis, we confine ourselves to local treatment of the primary lesion.

If the first syphilitic symptoms upon the general integument appear in the form of a macular or papular syphilide, we do not give antisyphilitics, even if there are degenerating mucous patches on the mouth and lips or tonsils, but attempt to relieve their painfulness and to induce involution of the patches by entire prohibition of smoking, by touching them with lunar caustic, by frequent application of tanno-glycerin (tannin 5.00, glycerin 20.0). If the symptoms have not disappeared at the end of eight weeks or if no essential improvement is noticeable, we give the iodides to the patient.

If the symptom-complex has not disappeared at the end of ten weeks more or even if they have run their course, we may pass to mercurial treatment without any bad results as regards the subsequent course. We favor particularly Zittmann's decoction or inunctions of gray ointment. In this way we usually need a smaller number of inunctions to cause the disappearance of the symptoms than when the mercury is used from the start. We rarely order mercury internally or subcutaneously. Injections of calomel are the most rapid and vigorous form of subcutaneous medication.

Although it does not belong within the province of this treatise, I will nevertheless report on a few cases which we have treated, since May, 1887, with Neisser's calomel emulsions. Since June, 1886, Neisser has used calomel suspended in oil with great benefit. This diminishes very considerably the pain of the injections and almost entirely prevents abscesses.

We have had the opportunity of observing twenty-nine patients in whom calomel, suspended in oil, has been injected into the muscles for the relief of the syphilitic symptoms from which the patients were suffering. Of these patients, three attended constantly to their business, while twenty-six were kept strictly in bed. There were 94 injections made in the 29 patients, 64 injections in 19 men, 30 in 10 women. 11 men and 6 women were discharged from treatment; 8 men and 4 women are still under observation. In those discharged from treatment all the syphilitic symptoms present at the time of admission had disappeared; in one patient, who is still under observation, the papular syphilide has not yet disappeared, although four injections have been made, and in a second patient the symptoms of a papular syphilide are undergoing rapid absorption, so that after two injections (at an interval of a week) only a slight pigmentation is noticeable at the location of the papules. In the other patients, who are still under observation, all the symptoms of syphilis have disappeared. The smallest number of injections necessary for the extinction of the symptoms was two, the largest number six. The average period until the disappearance of all the symptoms was 29.1 days, the longest period 47 days, the shortest 21 days. Four patients suffered from gingivitis, despite careful attention to the mouth. In one case it occurred thirty-six hours after the first injection, in another three days after the second injection. Gingivitis after calomel injections appears to last longer than when it results from the injection of other mercurials or inunction of gray ointment. In our cases all injections were made into the buttocks, upon two successive days, and then an interval of two weeks was allowed to elapse. In none of the twenty-nine cases did abscesses form. In some cases the pain at the point of injection was very slight. In the majority the pain was not greater nor did more extensive infiltrations develop than when a soluble preparation of mercury was injected. Very large and painful infiltrations formed in only seven cases. We reserve further communications on this mode of introducing mercury, and will report fully as soon as a large number of long observed cases are at our command. We may here say, however, that we regard Neisser's modification of the calomel-injection method as a very valuable addition to the therapeutics of

syphilis. We always prescribe Neisser's formula: calomel vapore parati 1.0, olei oliv. 10.0 and use injection needles 3.5 to 4 cm. long, which are kept constantly in 5% carbolized glycerin and are carefully washed in distilled water before using.

We now return to the consideration of our mode of treatment. It is known that although antisyphilitic treatment causes disappearance of the symptoms, the syphilitic diathesis is not extinguished in all cases. If this were not true, relapses could not occur after a longer or shorter interval. We therefore continue treatment with the iodides for a long time after all symptoms have disappeared, at least six months, at the most a year. If new symptoms appear, we first use iodides. If the symptoms disappear very slowly or not at all, we again resort to mercury, but endeavor to restrict its use as much as possible. After the syphilis has been treated in this way, the patient is sent to the Haller iodine baths, if his means and the season of the year permit. After he has returned we again resort to potassium iodide or sodium iodide and these remedies are continued with longer or shorter intermissions, in case of the occurrence of symptoms of iodism. But if the patient cannot visit the baths, the iodine water is drunk at home for some time, and then one of the iodide preparations again administered. If the patients have special confidence in mercurials, as often happens, a series of ten to twelve inunctions may be carried out during this year in vigorous individuals, even if there are no manifest symptoms of the disease. We know from the experiments of Hebra and H. Zeissl that even a larger number of inunctions are tolerated by healthy individuals without injury.

We have hitherto been satisfied with the results obtained by this plan of treatment and have seen no bad effects from the protracted use of iodides. As regards the statement of Fournier and other writers, that the frequent occurrence of severe diseases of the central nervous system is seen most frequently in cases of syphilis which have been treated insufficiently or not at all, we must contend that we have seen such symptoms in patients who have been treated very long and vigorously. Inasmuch as we know that the disappearance of the diathesis does not follow immediately on that of the symptoms, we must entertain the wish that the treatment be con-

tinued longer than is now customary. This is done in our method by aiding spontaneous recovery and only resorting to medicinal treatment after the former has done its work. As a matter of course, mercurial preparations can only play a subordinate part in treatment continued for half a year, a year or even longer.

That a patient is permanently cured of syphilis can only be maintained with some degree of positiveness when he remains well for one or two years after the disappearance of the last symptoms.

THE TREATMENT OF INEBRIETY

IN THE

HIGHER AND EDUCATED CLASSES

BY

JAMES STEWART, B.A.

Member of the Royal College of Physicians of Edinburgh; Licentiate of the Royal College of Surgeons of Ireland; Fellow of the Medical Society of London; Member of the Medico-Psychological Association, and of the Society for the Study of Inebriety; Formerly Surgeon in the Royal Navy.

THE

TREATMENT OF INEBRIETY

IN THE

HIGHER AND EDUCATED CLASSES.

Privileged as I am to-day to read the first paper of the year before this Society, I cannot refrain from the expression of a hope that our studies in 1889 may result in real progress in the scientific research in which we are engaged. Let each member bear in mind during the whole of this year that we all profess to be students of a particular disease, and that it behooves each of us to labor diligently in the field of observation wherein we are all fellow-workers.

The particular branch of the subject on which I have to address you to-day is one which has engaged my attention almost exclusively for the last twelve years. Even after accumulating so many facts as must necessarily have come under my observation during all this time, I would have hesitated to undertake the task now before me, had I not been urged thereto by the worthy Captain of our band of workers. He represented to me that practical experience such as I could boast of should not, if I were loyal to the Society, be withheld from my fellow-members. You will allow me here to give utterance to the hope, which I know is shared in by all who are present to-day, that we may long have as our leader so genial, so hard working, so encouraging a captain as we have at present in our beloved President, Dr. Norman Kerr. How often by his kind and sympathizing expressions during the last twelve years has he prevented me from yielding almost to despair when I saw so small a result appearing after so much labor! Were it not for his so constantly reminding me

that the knowledge of having done anything conscientiously was in itself a reward, I doubt if I would be able to stand before you in the position I occupy by your favor to-day—a reporter, as it were, of reflections suggested during work still in progress.

And now, you may ask me, what is there in the disease of inebriety as it is found among the cultured classes to justify my devoting the time at my disposal to the consideration of such a small branch of the subject? I would answer by reminding every practical physician before me to-day of the great differences there exist in the types of *all* diseases according to the surroundings of patients, but of none more than of those suffering from nervous affections. And then, again, in reference to the treatment of the same type of nerve disease in different classes of patients, one is compelled to recognize the necessity of adapting remedies in a very elastic fashion to surrounding circumstances. The inebriate whose manner of life and daily occupations make him familiar, from his earliest years, with squalor and wretchedness has a physical constitution very different from that of the squire, who has been nursed in the lap of luxury from his infancy. What in the former case might be most suitable and effectual treatment would in the latter be simply absurd.

But here I find myself taking for granted that all the scientific world of medicine now looks upon inebriety as a physical disease, associated with loss of will-function—a loss implying, as I take it, a greater or less lesion of nerve tissue. I ought to have remembered that but a few months ago the editor of one of our leading medical weeklies, when alluding to the systematic lectures of Dr. Norman Kerr, spoke of inebriety as an "ailment." In the same article, however, there was quoted a paragraph in which no less an authority than Professor Bünge referred to it as the "alcohol plague." Between these two extremes is to be found what seems to me to be the true position.

I have little doubt but that, when our microscopists have made the discoveries which are foreshadowed already, it will be proved, to the satisfaction of the most exact pathologist, that in the case of every inebriate who dies before the *vis medicatrix naturæ* has had time to do its reparative work, an absolute *degeneration of certain brain elements* has

taken place. It will be found, I make little doubt, that this degeneration, this tissue change, is as decided as the result of slicing off a portion of the finger top while cutting a loaf of bread. The wise man who meets with an accident such as this wraps up the injured finger so as to exclude from the wounded surface what would interfere with the growth of new tissue, *i.e.*, with the laying down of fresh substance to replace what either has actually been bodily removed by the knife, or will, in the inevitable course of events, be lost by ulceration.

If we have a conviction that the pathology of inebriety is such as I have thus briefly hinted at, we may approach our patients of the cultured classes in a manner which will commend itself to their reason and understanding. And here I would interpolate the observation that in this power which pathological *convictions*, if not undeniable facts, put in our hands we have a valuable aid in dealing as physicians with an inebriate whose intelligence has been cultivated by higher education—help which is not available if we are dealing with those who have not had such advantages. But to pursue my analogy of the injured finger, or rather the finger from which a portion has been absolutely sliced at the top. The inebriate, we believe, has sustained an injury to his brain substance. We know by observation that there is certainly a loss of will-power in every inebriate without exception. We also know that the power of distinguishing truth from falsehood is invariably weakened in the drink-craver.

All that we can do as physicians is to *assist nature* in her efforts to regenerate the injured nerve tissue—to build up again the brain elements through the medium of which the will-power and other functions are exercised. What particular portion of the brain is used in the exercise of these faculties we cannot now say absolutely; but the researches of Ferrier and others may yet enable us to put our finger on the parts involved as certainly as we can now on the "centre for speech," and be equally positive as to the functions in relation.

If we could induce our patients to shield Dame Nature from interference while rebuilding injured brain tissue as carefully as they do while she is rebuilding skin or muscular tissue, the number of cured inebriates would be increased a hundredfold. One great use, in my mind, of a society such as ours is to bring before the public arguments in support of decided

views as to the pathology of inebriety, so that when a man or woman of education becomes the victim of the disease (call it "ailment" or "plague," whichever you prefer) the physician, on being asked what had better be done in the case, may find the ground somewhat prepared for him, and the patient all the more likely to accept as rational the mode of treatment based on such pathological dicta.

I am addressing to-day some west-end physicians. Let me suppose then that one of you gentlemen has before you an intelligent drink-craver who recognizes that he is suffering from a degeneration of nerve tissue. Let me take for granted that he has come to you of his own accord—that he has driven up to your hall-door in his own brougham—that while sitting in your consulting room he has detailed to you how he has, over and over again, resolved to loose himself from his enemy, and over and over again failed in the attempt; how he feels ashamed of himself when he recovers (temporarily) from the result of his yielding to the temptation to take what is ruining his health, destroying his prospects, alienating his friends—ay weakening even the ties of a life-long affection that binds him to the noble woman whom, in happier days, he had induced to leave the shelter of a joyous home in order to become his wife.

Listen to him as he goes on further to describe to you how the literary work, to which he had been devoting his leisure moments, and which promised to increase his reputation and add to his wealth, had been almost entirely given up; that when he settled down to his books and MSS. he felt much enjoyment in the work at first, but that his energy soon failed, and an irresistible impulse had led him to take a glass of brandy, just "as a fillip," which quickly lost its effect, and he had been compelled to call for more; how his wife with tears in her eyes had over and over again besought him never to touch the accursed poison; how he had promised her faithfully, earnestly, and honestly, to abstain entirely from even beer for a dinner drink, but that he found himself led to do what he had never done before—to deceive her whom he loved as the apple of his eye, and who was the mother of his darling children. Allow him to continue his tale of self-accusation interlarded, as it probably will be, with protestations that between the attacks (which are separated from each other by

shorter and still shorter intervals of time) he is able to transact his business, attend to his parliamentary duties, and proceed with his literary work as well as ever, remaining all the while a total abstainer. At last he will come to the point which took him to your consulting room and he will say:—"Now, doctor, I want you to give me some medicine that I can take when I feel one of these attacks coming on, something you know that will prevent my having that terrible crave." He will then confess to you that he formerly thought he could give up the accursed habit himself, when he pleased, merely determining never to touch alcohol in any form, but that he had at last found that without some help he could not carry out his resolution.

My advice to you is to address your M.P. friend somewhat in this wise: "My dear sir, you are suffering from an injury to your cerebral tissue. That portion of your brain which is used every time you exercise the will-power is affected. Alcohol is a poison which has what we call an affinity for that portion of the brain. It seeks out, as it were, that particular spot, and there exercises its destroying power. Now if you want to get that injured tissue restored; if you want"—and here you can take some spongiopiline or like substance from your drawer, and gouge out enough to hold a threepenny piece, then pointing to the depressed surface you may continue thus: "if, I say, you really wish to have the depression in your brain (as decided as the one you see here) filled up by new matter, it is *not impossible* to get the work done. But I cannot do it for you. No medicine that I could give you would prevent you from acting as you have told me you do from time to time *until the depression I have referred to has been filled up.* Dame Nature will do it for you, but you must give her fair play. If you had broken your right arm, you would have gone to your friend Sir William, who would have told you you must wear a splint and give up all writing for a certain time. Why should the surgeon tell you to submit yourself to this great inconvenience? Just that Dame Nature might do her reparative work *unimpeded.* Now in the same way that you would submit to going about with a splint made of wood if your arm were injured, so must you consent to going about with a metaphorical splint attached to you while Dame Nature is rebuilding the injured part of your

brain. That splint must be the company of some one who will prevent you from doing aught that will impede the good Dame in her reparative work. A single glass of the mildest claret, a tumblerful of the lightest ale taken while she is at her work may cause—nay probably will cause—the destruction of what it has taken her weeks and weeks, ay perhaps months and months, to construct."

The M.P. will probably smile unbelievingly, but you must stick to your guns and continue the attack, saying: "You look surprised, my friend, but were you as well acquainted with the way in which Dame Nature works as I am, you would cease to be incredulous. You would know that she is able to lay down new tissue only at a rate varying according to the part of the body where her reparative powers are called into requisition. You would know that inside that bone-box you carry above your shoulders she works *very slowly* indeed; and I'll venture to say that, if you consult a dozen of the eminent physicians of the day, at least ten of them will assure you that the brain, injured as I have told you I believe yours to be, cannot be repaired thoroughly unless her ladyship is allowed to work, without the slightest interruption from King Alcohol, for a whole twelve-month." When you get thus far you will hear the pet of the House of Commons' smoking-room utter a groan that betokens a feeling of despair. But you must not appear to notice this, merely saying, "Come now, my friend, when will you let the splint be put on?" His reply will probably be in the form of a question such as, "Won't it do if my wife goes with me abroad? She'll act as the splint you talk of." You say, "No, emphatically no. Willing though she may be, devoted as I dare say she is, she is the last person in the world to whom I would entrust the task of acting as your shield against your enemy." "Well! what about my son? he has just taken his degree at the University, and a year's travel will do him good before he settles down." You answer, "No! not one of your relatives is fit for the task. You must go to some country doctor who has made a study of the treatment of the disease you suffer from: some one who will be a pleasant companion in your walks abroad, and from whom, or his deputy, you must *never separate yourself* while you are within possible reach of your enemy; some one who has a cheerful gentlewoman for a wife, the

joyful mother of children who will make you feel 'at home' under her husband's roof, who will in fact give you some of the poetry of life to enjoy while your treatment is being carried on by your prosaic but kind-hearted physician—the friend to whom, if you are wise, you will submit yourself as absolutely as you would to the surgeon if your arm were broken. Try and find a doctor who resides at least a mile from a pawnbroker's shop; search for one who lives in a bracing locality, far from club, hotel or 'public,' a doctor who will take you with him on excursions in the summer (by road or rail or steamboat) and follow the hounds with you on foot in the winter; thus putting in good working order the boiler and pump and other fittings in the hull, while Dame Nature repairs the damage done aloft. Let him be, if possible, a man who has rubbed off the angles of his character by foreign travel, a man with a vigorous constitution so that he may take a ten-mile walk with you in the forenoon, play lawn tennis or billiards with you in the afternoon, and take a hand at whist or go to a meeting with you, or a concert, or some such-like divertissement in the evening. Above all things take care that he is a man of religious feeling who will sympathize with you as one fellow-sinner with another. Remember, too, that if he is an honest man and you ask him to receive you as his patient for three or four months only, he will decline and tell you that suppose a surgeon were to undertake to make a man who had broken his arm fit to pull an oar in six days after the fracture, he would be scouted from the society of his professional brethren, and that he too would deserve to be similarly treated if he undertook to cure in an equivalently short time an *injured brain*, with probably heart, stomach, kidney, and liver complications."

After you have thus addressed your patient he will say probably, "Well, doctor, I'll think about it; but I must first consult the chairman of my committee down in Mid Blankshire, and see whether he thinks my constituents would consent to my being a year absent from the House. Then there's the home farm to be looked after, doctor, and the book I am preparing for the press and my daughter's possible—well I may say probable—marriage to come off in the autumn, and a lot of other odds and ends that must be seen to by myself before I go down to your friend with the charming wife!

Good-by, doctor, you'll hear from me when I make up my mind!" But months and months pass without his making up his mind, albeit he has been to several physicians who have practically given him the same advice. His book is not progressing, his wife is getting worn out, even her sweet expression is being displaced by a look of half-frightened suspicion, and the old tale—the same sad sequence of events—is repeated. He at last consents to go for six months. Be sure you warn him that the foundation will scarcely be laid by that time; but trust to the wisdom of your medical friend, with whom you recommend him to live, that the latter will induce him to extend the period to the minimum time required if a permanent recovery is to be looked forward to.

Now we will suppose your patient has reached the "Home." What ought to be his treatment there? If the resident physician be a man of experience he will cut off absolutely and entirely from the very first all alcoholic stimulants, whether in the shape of beer or claret or anything else.

The depression from which inebriates are generally suffering when they first reach a home requires the frequent administration of egg and milk, beef-tea, milk and lime water, soda and milk and other easily assimilated beverages, taken every hour and a half at first and gradually reduced in frequency. The sleeplessness from which almost all inebriates suffer at first is best treated by a draught composed of twenty minims of the solution of bimeconate of morphia with ten to fifteen grains of chloral, alternated for a few nights with other hypnotics. I am in the habit of putting into the bed-room of any gentleman who suffers from depression and dread of impending death a small bed which I occupy myself for the first three or four nights. As the strength of body returns gentle exercise ought to be insisted on, increased gradually till at least eight or ten miles a day for a gentleman, or five miles for a lady, can be accomplished with ease. If the patient does not engage in literary work or has no hobby, such as painting, music, wood-carving, carpentry, or gardening, he ought to take up crystoleum work, photography, or some other easily acquired art or occupation. The first is specially useful, as the ladies of the family circle may join the gentlemen while at it. Photography is greatly liked by those who are induced to learn it, affording as it does an excuse for excursions to the

country as well as occupation in the house. Gentlemen patients ought to be taken often to public meetings, and both ladies and gentlemen to concerts, cricket-matches and the like. Divertissements of one kind or another should, in fact, frequently be arranged for, the doctor always accompanying or a deputy on whom thorough reliance may be placed.

The patient suffering from the "drink-crave" ought, indeed, by one means or another, to have his or her mind constantly employed. The diet at the home should be plain but good, with the introduction of as few highly seasoned dishes as possible.

Here I would take the opportunity to protest against the mistaken idea, too common in the minds of many members of the medical profession, that by the exhibition of such drugs as capsicum you can destroy the craving for alcohol, or at least keep it under. You may perhaps smother it for a while by repeated doses of the perchloride of iron, or one of the class of drugs to which capsicum belongs, or possibly by what was for a while so much vaunted—a particular sort of bark, or the more recently recommended strychnine "cure;" but my experience leads me to the conclusion (supported by the testimony of the patients themselves) that you are by this treatment only substituting one enslavement for another. The same remark applies to some extent to aërated beverages. Without absolutely interdicting them I recommend my patients to do without them, to drink plain filtered water at their dinner and take plenty of milk with either tea or coffee. It should be drilled into the minds of drink-cravers that the addition of a little lime water will make milk digestible by even the most delicate stomach. The regular meals in a Home for Inebriates ought to be four in number, besides afternoon tea, the latter being invariably very weak. Dinner should be early in the afternoon. Supper ought to be a light meal and in the case, at all events, of resent admissions ought frequently to be composed principally of well boiled oatmeal porridge—which makes an excellent "night-cap." The drink-craver should be induced to take cocoa in preference to either tea or coffee, to avoid almost entirely condiments (cayenne pepper and the like) with his food at dinner; and if he suffers—as most inebriates do—from pain in the stomach after food, to take large draughts of very hot water twice or three times a day. Smoking should

be reduced greatly if it cannot be entirely given up. A walk of about a mile before retiring for the night is often found most beneficial for those who suffer from sleeplessness.

In order to carry out, under his own eye, such details of treatment as I have indicated, the physician who thinks he has an aptitude for dealing with inebriates ought to give up all general practice and devote himself to not more than five or six resident patients. The domestic family feeling is destroyed if the number of "guests" exceeds six. If he has a healthy energetic wife who is also a good pedestrian he may undertake this number, provided two out of the six are ladies. Even so the labor for both the physician and his wife is enormous; the strain upon the physical and mental energies is constant and exhaustive. No money remuneration can repay them for their toil. They must be content with the reward of a good conscience. The men who seem to me best fitted for carrying on such work successfully from the physician's point of view are retired naval or military surgeons whose pension enables them to keep a roof over their heads till they have established a reputation for dealing *honestly* with the ladies and gentlemen who put themselves under their care. I say "honestly," for I do not consider any man can possibly do justice to drink-cravers resident in his family if he has constantly to be separated from them while attending at the houses of patients whom he has to visit in the ordinary course of general practice. The story has been so often told me by men who have had experience of such "playing at treatment" that I am convinced that many inebriates *prefer* to go to such houses, because they can do what I was told by a stockbroker (who was under my care, but left me because I was too strict) —that he did frequently. He used to go out with the doctor in his stanhope on his country rounds; he soon found out the topography of the district and how long the doctor (who was to be his shield forsooth from temptation!) was likely to be in certain patients' houses. It was a very easy matter, as he had plenty of money, to induce the coachman to take him to a certain place on the road where he might gather ferns (it was in Devonshire). The coachman used to allow his master's patient to get out of the stanhope at a gap in the hedge near the fern-bank, and then he would walk the horse up and down while waiting for the enthusiastic botanist. Unfortunately

there arose very frequently a cloud—it was evidently "a cloud with a silver lining"—between that coachman and the gap (a little further down the road) from which a few minutes' run could easily take the stockbroker to the way-side inn. It was a matter of only a few more minutes to run back to where he had got out of the stanhope. This little manœuvre was gone through just as often as was necessary to keep the pocket flask pretty well supplied for the stockbroker's "night-cap."

One of the greatest difficulties in dealing with inebriates of the upper classes arises from this silver-lined cloud. I try to induce those who come to me to give to a brother or the family lawyer—by no means to the wife or husband (as the case may be) "power of attorney" over all their money while with me. Even this, however, does not always suffice. I had a county magistrate once in my house who used to write to his own tenants and get money from them with which he tried to bribe my servants. The risks connected with bribery ought to be reduced to a minimum. If a patient attempts to bribe a servant of mine and if the latter informs me immediately and the patient confesses, I double the amount offered, give this to the servant and charge the added sum in the patient's next bill.

One of the great objections in my mind to *large* establishments and homes under the Act is the necessity to have a large staff of servants. Every hireling almost is open to a bribe, and the fewer you have, consistent with keeping the house comfortable, the fewer are the difficulties you have to contend against in reference to clandestine introduction of alcoholic drinks. If a "Home" under the Inebriates Act is to pay, it must be capable of accommodating at least a dozen. Now I have said already that I consider five, or at most six, inebriates—all being of the cultured classes—are as many as any married physician and his wife, both working hard, can look after properly. Moreover, small homes have this great advantage, that they are not as widely known as the larger establishments, and the high-class drink-craver is not so averse to entering them.

But for inebriates of the cultured class there is to my mind, as a physician, a still greater objection to Homes under the Act. The essence of good treatment lies in your being able to get your patient to enter *con amore* into your plans, in induc-

ing him to treat you, as it were, as his partner in a scheme he has laid down for his own benefit. There should be the most thorough confidence between both. Suppose, for argument's sake, you have a patient with you under the Act; suppose that one day he sees his chance of evading you while in the town and goes off and gets drink. You pursue him, and after a wearying search you find him at the bar of an hotel sipping whiskey punch. You invite him to accompany you home. He refuses. You say, "Well! you really must come!" Finally you put into force the powers with which you are armed under the Act. You compel your patient to return under your roof. What pray are the relations thenceforward existing between you both? You are his jailer, not his confidential friend. He completes his time in your house and leaves you with the same feelings that a thief entertains for the governor of the prison in which he has been incarcerated. It would be a different matter if the length of time for which patients as a rule submitted themselves to the discipline of a Home under the Act were sufficiently long (say eighteen months) to allow the disagreeable reminiscences of this capture and forcible bringing back to the "Home" to have passed away. A physician ought to try and secure the coöperation of his patient *entirely*. When a man becomes the jailer, he ceases (in the mind of the inebriate) to be his physician.

One word, in conclusion, as to the importance of the physician who undertakes the difficult task of systematically treating the drink-crave not only being himself a total abstainer—indeed he ought to be a member of the Medical Temperance Association—but also insisting upon every member of his household being a pledged teetotaller.

Much more has been effected by me through the influence of example than by any precepts or admonitions. In fact I seldom allude to the subject except it be introduced by the sufferer himself or herself. My patients see what an active, vigorous, enjoyable life I lead, how lightly the burden of well-nigh fifty years is borne by me, albeit in the earlier part of my medical career my constitution was put to a severe strain by a fever contracted in the West Indies. They see that hard work and brightness and activity, and thorough enjoyment of life can be sustained without the so-called enlivening stimulus and "support" of wine or other alcoholic beverage. I believe

that the lesson the patients learn in this way is better than any others that can be taught.

Before I sit down I should like to summarize some of the conclusions at which I have arrived as a result of constant clinical study during the last twelve years: —

(1) Drunkenness and inebriety ought not to be confounded.

(2) Inebriety is a lesion of the brain which has gone so far as to affect the will-power.

(3) Successful treatment based on this pathological dictum must include the absolute cessation of alcoholic drinking.

(4) There is no danger in the sudden and complete withdrawal of alcohol if the case—no matter how severe—be in the hands of a skilful physician able to personally direct the hourly treatment from the first.

(5) The physician undertaking the charge of such cases ought to be a total abstainer as well as every one living under his roof, so that moral treatment by example may supplement therapeutic remedies.

(6) Permanent recovery need not be hoped for unless both lines of treatment be pursued, systematically, during an uninterrupted period of twelve months in a "Home" from which every beverage containing the smallest quantity of alcohol is absolutely excluded. The first four months barely suffice for the getting rid of the stomach and other troubles which are the result of the alcoholic poison; at the end of the second period of four months the patient begins to feel less the want of alcohol; by the end of the third period he has begun perhaps to understand that life may be enjoyed, and vigorous health secured without stimulants.

(7) So-called "cures" effected by bark, strychnine, iron, and other drugs have not proved permanent.

(8) The permanence of a cure depends greatly on the after-treatment pursued subsequently to the patient leaving the "Home." The family of the inebriate, or the household of which he or she is to form a part, ought all to become total abstainers, no alcohol being allowed under any circumstances into the house except as a drug prescribed by a medical man and dispensed in a medicine bottle.

MANUAL

OF

HYPODERMIC MEDICATION

BY

Drs. BOURNEVILLE and BRICON, of Paris

TRANSLATED FROM THE SECOND EDITION, WITH ADDITIONS

BY

ANDREW S. CURRIE, M.D. Edin.
Fellow of the Edinburgh Obstetrical Society, Etc.

REARRANGED AND REVISED

FOR THE USE OF AMERICAN PRACTITIONERS

MANUAL OF

HYPODERMIC MEDICATION.

PREFACE TO THE SECOND EDITION.

THE medical public accorded so favorable a reception to the "Manual of Subcutaneous Injections" that the first edition was exhausted in less than two years. This success imposed on us the obligation of bringing the greatest care to bear on the revision of our work and bringing it, as far as possible, up to date.

To the already long list of remedies employed by the hypodermic method which appeared in the first edition we have had to add a certain number which have been administered subcutaneously during the last two years. Such are—chrysarobin, osmic acid, agaricin, antipyrine, convallaria majalis, cocaine, cotoin, eucalyptol, ichthyol, kairine, nitroglycerin, paracotoin, paraldehyde, pereirine, permanganate of potassium, salicylate of sodium, and thalline.

Although we have consulted all the periodicals which we have been able to obtain, and the number of them is considerable, and although we have availed ourselves of the too rare communications that have been sent to us, we renew the appeal which we made on a previous occasion to our readers: viz., that they would point out to us any errors and omissions which they may observe in this new edition.

TRANSLATOR'S PREFACE.

THE "Manuel des Injections Sous-cutanées" of Drs. Bourneville and Bricon has achieved such notable success on the Continent, and, besides giving a great impulse to hypodermic medication, has done so much to advance the science of therapeutics generally, that no apology is, perhaps, required in introducing a translation of it to English practitioners. There

is not a superabundance of works in the English language on the subject of which this manual treats, for, with the exception of Dr. Bartholow's well-known and instructive treatise, "Manual of Hypodermatic Medication," the last edition of which was published in 1882, and Prof. Matthew Hay's admirable translation of Eulenburg's essay in Ziemssen's "Handbook of Therapeutics," nothing has been published in this country or America within recent years. The little work of Drs. Bourneville and Bricon possesses the advantages of being very complete and yet concise, of containing a large number of formulæ, of being well up to date, and, what seems to be a feature of no small importance, it points out the disadvantages which have accrued, or are apt to accrue, from the use of certain drugs by the hypodermic method.

It is with sincere pleasure that I take this opportunity of acknowledging the assistance which many kind friends have rendered me.

Drs. Bourneville and Bricon have taken a warm interest in the translation, and have helped me in every possible way. To Mr. Martindale I am indebted for valuable hints and also for permission to borrow formulæ from the "Extra Pharmacopœia." My colleague Dr Whitlaw Scott has rendered valuable assistance in revising the translation and correcting proofs. My brother, Mr. R. K. Currie, has helped me to an extent which it is impossible for me to over-estimate, by converting the metric system to the English equivalents and by revising the sheets before they were sent to press.

Numerous authorities have been consulted in the work of translation which it is impossible to mention in detail, but it would be ungrateful on my part were I not to particularize Dr. Neale's invaluable "Digest" and his recently published "Appendix to the Digest," which have been consulted constantly and in which I have rarely, if ever, failed to discover the information sought for.

In the hope of enhancing the value of the Manual, I have added a therapeutic index based on those in Dr. Ringer's "Handbook of Therapeutics" and Dr. Lauder Brunton's recently published work "Pharmacology, Therapeutics, and Materia Medica," a table of antidotes and antagonisms, a posological table, and a general index. With these exceptions there is but little added to the work for which I am personally

responsible, but it is hoped that these few additions will not be deemed irrelevant. They have been inserted on the principle so nobly expressed by Goethe—

> "Vor den Wissenden sich stellen
> Sicher ist's in allen Fällen!
> Wenn du lange dich gequälet
> Weiss er gleich wo dir es fehlet;
> Auch auf Beifall darfst du hoffen,
> Den er weiss wo du's getroffen."

It will be observed that, as a rule, the formulæ in this translation are in quantities of 16, or multiples of 16 minims. In the French edition Drs. Bourneville and Bricon generally adopt the gramme (the capacity of a Pravaz syringe) as the standard. In the Introduction they say that a Pravaz syringe with a capacity of one gramme is equivalent to 20 drops; but the drop is both an inconvenient and uncertain quantity, varying widely for different fluids, and accordingly the following system has been adopted in the translation. According to the British Pharmacopœia (1885), 1 gramme = the weight of 1 cubic centimetre of water at 4° C. Now the cubic centimetre is equal to 15.432 grain measures fluid, or 16.975 minims; (or somewhat less than this value according to the U. S. Pharmacopœia of 1882); but it is obvious that 17 would be a very awkward figure to take as the equivalent of the capacity of the Pravaz syringe, there being no figure that will divide 17 without a remainder, and had this figure been adopted there would have been a risk of falling into error where $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{1}{8}$ of a cubic centimetre was ordered. By adopting 16, however, as the standard, these fractions can be used with absolute correctness, and an ordinary hypodermic syringe can be employed in using the formulæ in the manual.

Where the dose of a solution is stated as one syringeful, it is to be understood that 16 minims is the quantity meant.

NOTE BY THE AMERICAN PUBLISHERS.

In preparing an American edition of this work, it was found necessary to make changes both in the text of the original author as translated, and also in the additions made by the English translator. The changes consist mostly in a rearrangmeent of the articles in proper alphabetical order, the introduction of a more consistent nomenclature in har-

mony with present views, the revision of data relating to the derivation, constitution, and physical properties (solubilities, etc.) of a number of chemicals, and the addition of practical notes, not from a medical, but from a chemical and pharmaceutical standpoint. The American publishers are under great obligations to Dr. Charles Rice for kindly arranging this matter, and the readers of the present issue of the work will enjoy the advantage which his careful revision will afford. It would have incumbered the text with too many notes in brackets to have indicated all the changes made, but many notes have been separately added, and signed with the initial "R." A number of notes, and references to literature not readily accessible to readers in this country, have been omitted.

HISTORY.

THE first attempts at hypodermic injections appear to have been made by Dr. Rynd ("Dublin Medical Press," 12th March, 1845); but it is to Dr. A. Wood (1855) that we owe the popularization of this method. Dr. Sieveking of London has claimed priority for M. Kurzak of Vienna ("Lancet," 1861, Vol. I., p. 309). According to Dr. Bartholow, Dr. J. Taylor, in a communication to the "New York Medical Gazette," asserted that he had used the hypodermic method from 1839, simultaneously with Dr. Washington; this proceeding had been suggested to them by Lafargue's plan of inoculation. They employed Anel's syringe. Langenbeck had also, before Rynd, employed the hypodermic method, but he abandoned it afterward for the method by inoculation. In England, we may mention, among the first experimenters, Messrs. Wright (whose observations were published in Wood's memoir), Oliver, Bonnar, B. Bell, Charles Hunter (who gave the name *hypodermic* to the subcutaneous method), Fuller, Cadwell, Cowan, Anstie, etc.

We may recall the fact that the injection of remedies into the veins was commonly practised in the 17th century; that the endermic method (Lambert) and the method of inoculation (Lafargue) had numerous partisans in the first half of the present century, to say nothing of the plan of dry injections of M. Bruns (1869). (See Eulenburg, "Percutane, intrac., subc., Arznei-Application," 1880, pp. 4, 28, 30, 34.) Valleix, who had used the endermic method in cases of neuralgia, had also attempted the introduction subcutaneously of remedies by

means of acupuncture needles. We may add that physiologists had for a long time practised the hypodermic method (Gaspard, Magendie).

The hypodermic method was introduced into France by Béhier and Courty; they made use of the syringe which Pravaz had devised for coagulating injections of perchloride of iron. Their example was soon followed by numerous authors:—Hérard, Vella, Vulpian, Follin, Gintrac, Benoit, Fournier, Dupuy, Dolbeau, Gosselin, Becquerel, Bourdon, etc.

In Germany, Drs. Bertrand (of Schlangenbad) and Genth (1857), A. V. Franque, Eulenburg, Lebert, Erlenmeyer, Semeleder, Oppolzer, Zülzer, Südeckum, von Graefe, Scholz, Hermann, Lorent, Nussbaum, Scanzoni, etc., were the first to practise subcutaneous injections.

In Italy, Gherini of Milan (1861), then B. Guala of Brescia, first employed hypodermic injections. We may quote, moreover, in the same country, the names of Timermans of Turin, Lesi, Porta, Scarenzio, Petrini, Monteverdi, Schivardi, etc.

Dr. Ruppaner was the first to introduce the hypodermic method into the United States (1860); Dr. Bartholow, however, attributes the priority to Dr. Fordyce Barker of New York (1856), then to Dr. Elliot (1857).

We think it will be useful to append here a list of the principal treatises and essays of interest which discuss the hypodermic method in its general aspect.

Südeckum—"Subcutane Injectionen medicamentöser Flüssigkeiten." Inaugural-Abhandlung, Jena, 1863.

Gaudry—"Injections sous-cutanées." Thèse de Paris, 1863.

Bois—"De la méthode des injections sous-cutanées." Paris, 1864.

Erlenmeyer—"Die subcutanen Injectionen der Arzneimittel," 1st edit., 1864.

Eulenburg—"Die hypodermatische Injection der Arzneimittel," 1st edit., 1865.

Hunter (Charles)—"On speedy relief of pain and other nervous affections by means of the hypodermic method." London, 1865.

Ruppaner—"Hypodermic injections in the treatment of neuralgia, rheumatism, gout, and other diseases." Boston, 1865.

Lorent—"Die hypodermatischen Injectionen nach klinischen Erfahrungen." Leipzig, 1865.

Jousset (de Bellesme)—"De la méthode hypodermique et de la pratique des injections sous-cutanées." Paris, 1865.

Gallot—"De la méthode hypodermique en général et des injections sous-cutanées de sulfate d'atropine en particulier." Thèse de Paris, 1866.

Schivardi—"La medicazione ipodermica." Milan, 1868.

Denis (A.)—"Considérations et expériences sur la méthode hypodermique." Thèse, Strasbourg, 1868.

Lesi—"La siringa di Pravaz e le injezione ipodermiche," 1868.

Michalsli—"De la méthode hypodermique." Thèse, Paris, 1868.

Bartholow—"Manual of hypodermic medication." Philadelphia, 1st edit., 1870; 4th edit., 1882.

Salvador Badia—"La curacion de la syphilis por las inyecciones hypodérmicas de bicloruro hydrargyrico segun los métodos de los profesores Lewin (de Berlin) y Letamendi (de Barcelona), con un appendice sobre la medicacion hipodermica en general." Barcelona, 1873.

Luton—"Etudes de thérapeutique générale et spéciale. Injections hypodermiques," p. 193. Paris, 1882.

Eulenburg—"Percutane, intracutane und subcutane Arznei-Application," in "Handbuch der allgemeinen Therapie," von H. v. Ziemssen. Leipzig, 1880, B. I., III. Theil.

Bernatzik—"Hypodermatische Methode" in "Real-Encyclopädie der gesammten Heilkunde." B. VII., 1881, pp. 21 *et seq.*

Cochet—"Contributions à l'étude des injections hypodermiques." Thèse de Paris, 1883.

Frederico Gomez de La Mata—"Manual de inyecciones hipodermicas." Madrid. This manual is largely composed of articles by us which appeared in the "Progrès médical" in 1883.

Luton—"Transfusions hypodermiques" ("Archives générales de médecine," December, 1884).

Subcutaneous Absorption.

All authors are agreed in admitting absorption by the cellular tissue; it is constant, regular, and effected with great rapidity, less rapidly, however, than absorption by the respiratory mucous membrane or by the veins (intravenous in-

jection). The acceleration or retardation of absorption may be brought about experimentally by section or galvanization of the great sympathetic (see on this subject, Claude Bernard, "Leçons de Pathologie exp.," 1872, pp. 285–287). Apart from the influence of the nervous system on the rapidity of absorption, it is to be observed that all substances are not absorbed at the same rate (experiment of Bernard with ferro-cyanide of potassium and lactate of iron). Moreover, the rate of absorption of the same substance varies in direct proportion to its solubility.

Such is the general rule; but there are certain circumstances in which absorption is modified. It is thus that some remedies, introduced under the skin, may, by their local action, induce inflammatory troubles which disturb the therapeutic and physiological results (a large number of substances coagulate with albumen), or even prevent these results by opposing absorption. This last result is sometimes sought for, when, for example, in malignant pustule we endeavor to limit the original situation of the pus by the aid of peripheral injections of iodine.

Absorption by the cellular tissue being recognized as incontestable, it remains to be shown in what manner it is effected. Here we encounter a great variety of opinions; absorption by the veins, capillaries, lymphatics, by diffusion, etc. In the present state of our knowledge we believe there is no doubt that absorption in the subcutaneous cellular tissue is chiefly effected by means of the lymphatic system, and in support of this opinion we can appeal to no stronger testimony than that of M. Ranvier.[1]

"The fibres and membranes of which the connective tissue is composed, constitute," he says, "a system continuous of itself in all parts of the organism, furrowing and partitioning, in various ways, a vast reservoir, all the chambers of which communicate with one another. The great serous cavities form just as much a part of this system as do the interstices of the loose connective tissue. This reservoir belongs to the lymphatic system, and in all its parts it contains lymph elements. The direct communication of the large serous cavities with the lymphatic vessels is a fact conclusively proved by science; the origin of the lymphatic vessels in the meshes of the loose connective tissue is still an open question, but, *à pro-*

pos of the lymphatic system, we may detail a series of facts which tend to prove that they really arise in the interstices of this tissue. . . ."[2]

Regarded from the point of view of the mere administration of drugs, subcutaneous injection, when the substance injected does not excite local troubles, offers in addition to the benefit of rapid absorption, this great advantage that the medicine is absorbed in its entirety without any modification; all which conditions place the hypodermic method far above every other mode of administering remedies.

The experiments of Messrs. Eulenberg and A. Denis show that *the site* at which the injection is made exercises an important effect on the rate of absorption: moreover, the effects produced by similar doses vary with the region injected. (Lambert, as far back as 1810, pointed out that absorption was more readily effected on the inner surfaces of the thighs and legs, arm, forearm, and anterior surface of the chest.) These gentlemen have made some interesting observations which are summarized in the following table: —

1. Temples and cheeks.
2. Epigastrium.
3. Anterior portion of thorax.
4. Supra- and infra-clavicular regions.
5. Inner aspect of arm and thigh.
6. Nape of the neck.
7. External aspect of thigh and arm.
8. Forearm.
9. Leg.
10. Foot.
11. Back. (In the last two regions the effect is often nil.)

Despite the authority which necessarily attaches to the names of the authors whom we have quoted, we think it right to accept this classification with a certain amount of reserve.

Solutions.

The details which we give under the head of each drug rendering it superfluous for us to enter here at great length into the question of solutions, we will therefore confine ourselves to a few general remarks. It is often desirable to make use of fresh and even of specially prepared solutions; distilled water

is the best vehicle, provided it is not a question of alterative injections. Solutions in equal proportions of glycerin and water are well borne by the tissues, but other solvents or vehicles can also be employed without inconvenient results (so cherry-laurel water, ether, alcohol, oils, etc.).

We may add that it is desirable, when possible, to inject fluids at a temperature of about 37° (98.5° F.); and that it is often advantageous to add to the solution a few drops of a solution of carbolic or salicylic acid [or to use chloroform water in the preparation of the solution], for its better preservation.

The solutions should be as far as possible neutral: it would, however, be a mistake to suppose that this is absolutely indispensable. In fact, we are often obliged to have recourse to *acid solutions,* which are as a rule more or less painful. Here we must observe that the pain is not generally proportionate to the acidity of the injection; thus, solutions of sulphate of quinine in tartaric acid are more painful than solutions made with sulphuric acid, although the acidity in the latter case is much more intense.

In other instances, the irritating quality of neutral solutions depends upon the substance dissolved, as we shall see when we speak of local irritations. Hence it follows that the mere fact of a solution being neutral is not sufficient to insure its being free from irritating qualities.

The degree of concentration of the solutions remains to be considered. In regard to substances of very active properties this is of minor importance; but for most substances we are precluded from employing the hypodermic method, either because the solubility of the drug to be used is too slight to permit of its being injected in sufficient quantity without serious inconvenience, or because when the remedy is obtained in the necessary degree of concentration it acquires irritating properties.

In some countries, especially in England, use is made of hypodermic injections extemporized from solutions of gelatin discs containing measured doses of the required drug; these discs are dissolved in a few drops of distilled water.

Eulenburg and other authorities discountenance the practice of filtering thick solutions, a custom which, owing to the nature of the medicament, may diminish the activity of the

solution. M. Bourdon is equally opposed to filtering old solutions which have become thick or muddy by the development of cryptogamic filaments: these solutions have in fact to a large extent lost their medicinal properties and should be prepared afresh.

Percentage solutions are most convenient, and the following may be taken as the type or unity.

Salt, ...	1
Distilled water, ...	99

If we take one gramme (15½ English grains) of water as equivalent to twenty drops, it follows that a syringe with a capacity of one gramme would contain a centigramme (about one-seventh of a grain) of the active principle, and one drop weighing five centigrammes would contain half a milligramme (a milligramme is equivalent to about $\frac{1}{64}$ of a grain). But the drop is of all forms of dosage the most inaccurate, the drops given by different instruments being never quite identical, although it is in very common use: it would therefore be preferable to reckon by weight. The various tables published by authors, among others those of Messrs. Réveil, Bouchardat, Yvon, show remarkable variations even for the same fluid.

We give below the table published in the essay of M. Surun. This table, which we have thought it better to abridge somewhat, shows the solubility of a certain number of substances in one hundred parts of glycerin. [This table is quoted by but few authors. Other tables of solubility can easily be referred to in other works, as that of M. Fonssagrives, etc.]

Bromine, ...	In all proportions.
Iodine, ...	1.90
Bromide of Potassium, . .	25
Iodide of Potassium, . . .	40
" Zinc, ...	40
" Iron, ...	In all proportions.
Sulphide of Sodium, . . .	" "
Bisulphide of Potassium, . .	25
Cyanide of Potassium, . .	32
" Mercury, . . .	27
Chloride of Ammonium, . .	20
" Sodium, . . .	20

Chloride of Barium,	10
" Antimony,	In all proportions.
Perchloride of Iron,	" "
Bichloride of Mercury,	1.50
Chlorate of Potassium,	3.50
Hypochlorite of Sodium,	In all proportions.
" Potassium,	" "
Arsenious Acid,	20
Arsenic "	20
Arseniate of Sodium,	50
" Potassium,	50
Sulphuric Acid,	In all proportions.
Nitric Acid,	" "
Phosphoric Acid,	" "
Hydrochloric Acid,	" "
Chromic Acid,	Decomposes.
Acetic Acid,	In all proportions.
Tartaric Acid,	" "
Citric Acid,	" "
Oxalic Acid,	15
Boric Acid,	10
Lactic Acid,	In all proportions.
Benzoic Acid,	10
Ammonia,	In all proportions.
Carbonate of Sodium,	98
Bicarbonate of Sodium,	8
Carbonate of Ammonium,	20
Urea,	50
Borate of Sodium,	60
Alum,	40
Sulphate of Iron,	25
" Zinc,	35
" Copper,	30
Nitrate of Silver,	In all proportions.
Bichromate of Potassium,	Decomposes.
Permanganate of Potassium,	"
Acetate of Lead,	20
" Copper,	10
Tartar emetic,	5.50
Tartrate of Iron and Potassium,	8
Lactate of Iron,	16

Tannin,	50
Quinine,	0.50
Cinchonine,	0.50
Sulphate of Quinine,	2.75
" Cinchonine,	6.70
Codeine,	In all proportions.
Morphine,	0.45
Hydrochlorate of Morphine,	20
Atropine,	3
Sulphate of Atropine,	33
Strychnine,	0.25
Sulphate of Strychnine,	22.50
Brucine,	2.25
Veratrine,	1

Instruments and Operative Procedure.

I. Instruments.

The first physicians who had recourse to hypodermic medication made use of a variety of syringes, among which we may quote:—1st. Fergusson's syringe, the needle of which, being of too large calibre, in penetrating the tissues tears them, and occasions thereby severe pain; this syringe, which

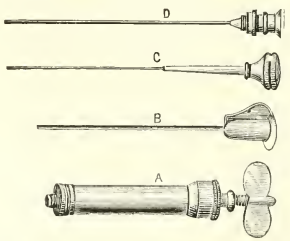


Fig. 1.

as a rule is badly graduated, was chiefly employed by Wood. 2d. Pravaz's syringe (Fig. 1) the piston of which has a screw action, each half turn of the screw expelling from the extremity of the canula one drop of solution. These two syringes, which are not used now, were invented by their designers for the use of coagulating injections of iron perchloride.

Pravaz's syringe as modified by Béhier (Fig. 2) is a trocar syringe; it has, apart from its small capacity, this inconvenience that it necessitates a prolonged operative procedure; moreover, the quantity of fluid expelled by each semi-revolu-

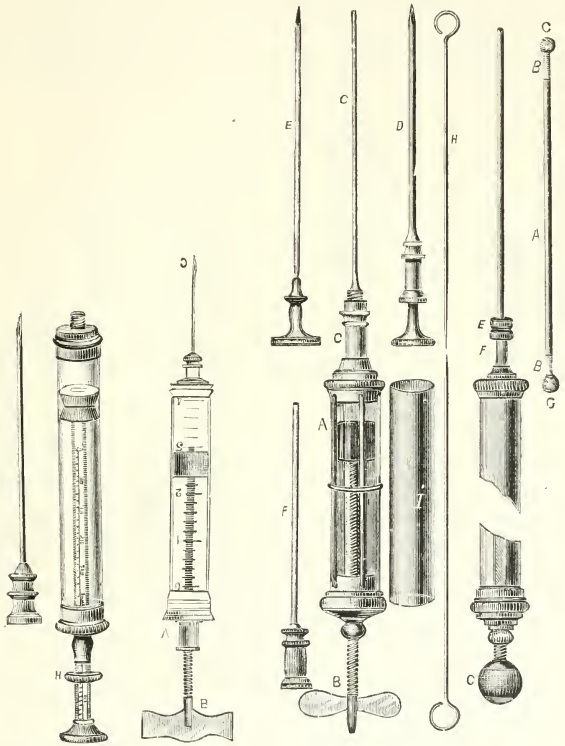


Fig. 2. Fig. 3. Fig. 4.

tion of the piston is uncertain and varies with the syringe. Béhier, however, has himself discontinued its use. The metal cylinder of Pravaz's syringe was replaced by one of glass.

The decimal syringe of M. Mathieu has a capacity of four

grammes; the barrel of the syringe is of glass and has four circular divisions, each corresponding to one gramme (Fig. 3).

M. Charrière abandoned the trocar of the Pravaz-Béhier syringe, and replaced it by a perforated needle, one of its extremities having a sharp cutting point, and furnished at the other end with a screw which fits on to that which terminates the syringe (Fig. 4). Since the introduction of this instrument the screw of the piston stem has been replaced by a stem fur-

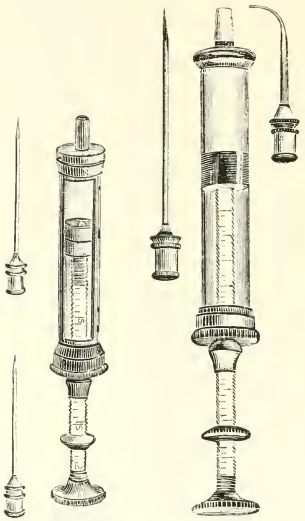


Fig. 5.

Fig. 6.

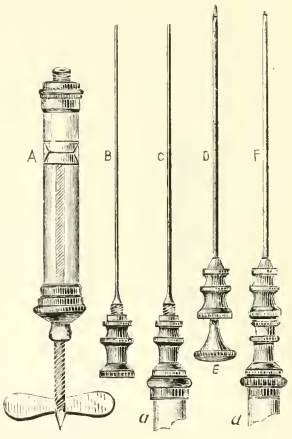


Fig. 7.

nished with a running screw-stop (Fig. 5, Collin's). The barrel of the syringe has a calibre graduated for one drop of fluid to each millimetre.

The syringes of Leiter and of Lüer (Figs. 6 and 7) are glass syringes with a large flat piston stem marked off into divisions which indicate, when it is drawn out, the quantity of fluid contained beneath. The extremity carries a hollow needle with a harpoon-shaped end. M. Lüer's syringe is the one most commonly in use in Germany and France. [M. Lüer appears to have been the first to have replaced the screw

piston by the graduated piston with the running screw-stop, and the screw nozzle by a smooth surfaced nozzle.]

A syringe which is in very general use, and which is still commonly known as Pravaz's, is composed of a crystal barrel, strengthened by two vertical stems. These stems are united by two nozzles which close the instrument above and below: the inferior nozzle is in the form of a canula, intended to be adapted to the canula of the needle; the upper nozzle is pierced by a hole through which the stem of the piston passes: this stem is marked with twenty divisions, each of which corre-

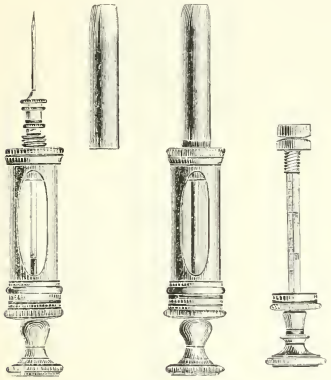


Fig. 8.

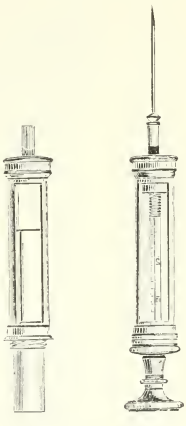


Fig. 9.

sponds to a drop of fluid. The capacity of the syringe is one cubic centimetre or twenty drops.

Sometimes the fluid is expelled by rotation of the piston, for which purpose the stem is furnished with a screw; at others, on the contrary, the piston is worked by pressure, in a straight line, with the finger, on a knob by which the piston is terminated. To the syringe is fitted a canula ending in a needle of strong steel and with a sloping cutting edge at its extremity.

We need not do more than mention the syringes of Travoy, Danet, Bourguignon, de Graefe, C. Hunter, Liégeois, Coxeter, Young, Bartholow, Gemrig, Ward, Cousin, Buzzard, Cutter,

Dop; the syringe of Arsonval (made by Aubry), having the needle perforated at different levels, for submucous injection; the vulcanite syringes of Tiemann, Mules, Galante (Figs. 8 and 9) [the glass cylinder is movable, the needle is protected by a cylindrical sheath, perforated at its extremity; the instrument may be safely carried in the pocket], of Maisonneuve (Fig. 10), of Krause; lastly, the syringes of large capacity, such as the infusor of Hueter, with a capacity of 14 grammes, and that of M. Dujardin-Beaumetz, with a capacity of five grammes. Dr. Jennings recommends the use of an instrument with a graduated barrel, furnished with a pipette.

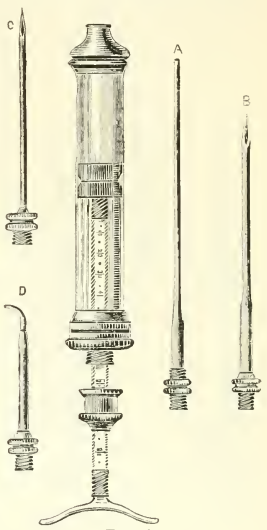


Fig. 10.

Some agents act on the syringes and corrode them. Such are the salts of mercury which attack after a time even gold needles. Hence the advice of M. Neumann not only to rinse with water after having used the needle, but to blow air through it by means of an india-rubber ball.

In conclusion we may mention the complex cases containing, besides the ordinary Pravaz syringe, either medicines, or other needles for use in deep injections. Such is that of Messrs. Burroughs and Wellcome who have devised a portable hypodermic case. This contains (Fig. 11), besides the syringe, a certain number of tubes inclosing Wyeth's hypodermic tablets; these tablets, which we regret are not generally used in France, are composed of an alkaloid combined with a sufficient quantity of sulphate of sodium to obtain the necessary consistence. One of these is dissolved, when required, in a few drops of distilled water. We can see how, by this means, the injection can be more readily effected, to say nothing of the advantages which accrue to the practitioner from always having a collection of the principal alkaloids at his command.

The syringe of M. Delore of Lyons (Fig. 12), made by M. Mathieu, has a capacity of 4 grammes (about 64 minims); the piston stem has 40 divisions. To this syringe can be applied, (1) a needle like those of the ordinary Pravaz syringes; (2)

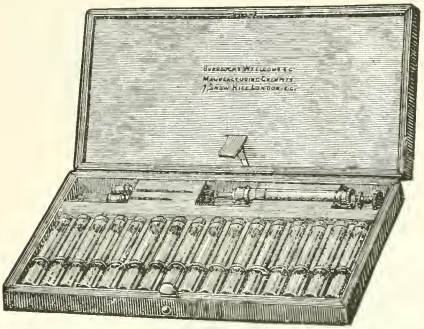


Fig. 11.

two metal canulæ with a length of 13 centimetres; one has a needle perforated in the usual way, the other is made so as to carry a gum elastic sound, and has two lateral perforations. The syringe is, moreover, furnished with two wings which impart steadiness to the instrument during the injection. M. Delore's instrument is made of silver to prevent any chemical

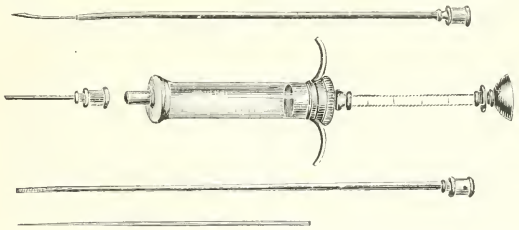


Fig. 12.

action upon it by the solutions. It can be employed like the ordinary Pravaz syringe to practise interstitial injections into the uterine tissue, or it can be used with the canula and gum elastic sound to make ordinary intra-uterine injections.

A very convenient combination of hypodermic syringe and

accessories is that shown in Fig. 13, all the parts being securely held in compartments within a metallic case having either a hinged or a removable lid.

Brown's pocket case hypodermic syringe is of hard rubber, and of about the size of a stylographic pen. At the lower end is a receptacle capable of containing about a dozen compressed pellets for making hypodermic solutions.

Another convenient pocket case syringe is Stimson's, Fig. 14. The point including the wire cleaner fits into a hollow

Fig. 13

Fig. 14.

graduated piston. The barrel is an ordinary silver tube, about three inches long.

Recently some makers have constructed syringes which can be adapted to a little vial containing the solutions, thus allowing the syringe to be charged without exposing the solution to the air (Figs. 15 and 16). Fig. 17 shows the models of Messrs. Mathieu and Collin.

[Messrs. Ferris and Co., Bristol, make a small syringe which

was suggested by Dr. Sheen of Cardiff. It is chiefly intended for morphine injections, has a capacity of five minims, and is designed so that it may be attached to the watch chain, to which it forms an elegant appendage (Fig. 18).

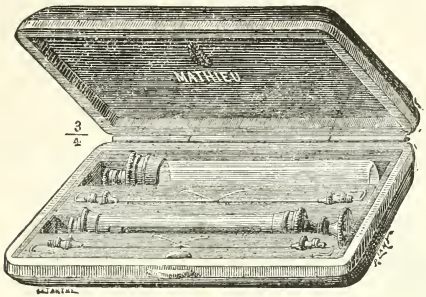


Fig. 15.

The accompanying illustration (Fig. 19) represents a hypodermic pocket case designed by Messrs. Burroughs and Wellcome. The case instead of being pasted is sewn, and is thus

Fig. 16.

rendered more proof against the effects of heat and damp. It contains a small syringe of solid silver, which fits into a silver case provided with a cap. This cap answers two purposes:—

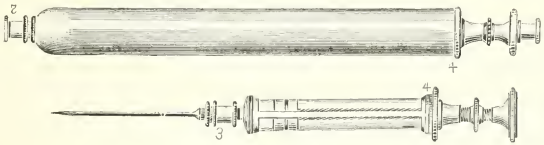


Fig. 17.

it prevents drying and consequent shrinking of the piston-packing, an inconvenience which is only too common with syringes that are laid aside for any time and it is used as a mortar in which the hypodermic tabloids are powdered. In

addition to the syringe, the case is provided with several tubes of tabloids containing precise doses of the alkaloids in most

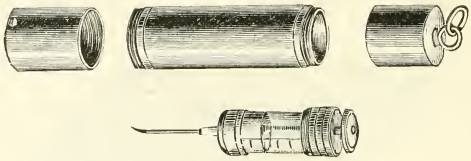


Fig. 18.

general use, such as morphine, atropine, ergotinine, apomorphine, etc. A writing tablet is also provided. The whole case

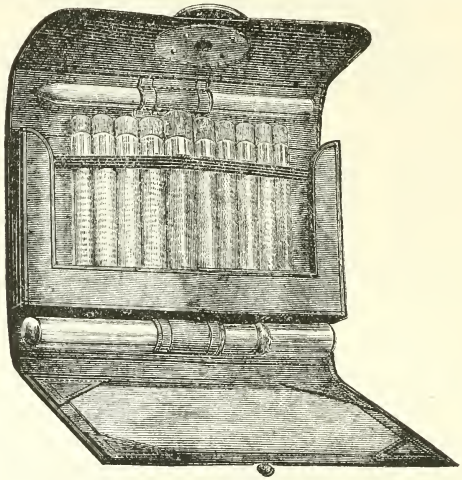


Fig. 19.

is in such small compass that it can be carried in the pocket without inconvenience.—*Trans.*]

II. Operative Procedure.

Before using a needle it is necessary to ascertain its perfect cleanliness and to see that it is in working order. The solution being in readiness, the instrument must be filled, care

being taken to exclude air, and the needle should be anointed with carbolized oil. There are two methods of introducing the needle; some recommend that it should be first introduced by itself and that the syringe should then be fitted on to it; others, on the contrary, and this is the usual practice, adjust the needle to the instrument before insertion.

Some assert that certain accidents which may occur are guarded against by the first method of procedure; that if, for example, the needle has penetrated a vein the operator is warned by the escape of blood through the needle or by its unnatural mobility. We do not think that these accidents need be feared; and in any case the advantages of this method do not compensate for its disadvantages, such as the longer time it takes, the greater risk of tearing the cellular tissue, etc. Those who adopt the other plan push in the needle either slowly or suddenly.

To introduce the needle into the subcutaneous cellular tissue, the operator seizes a fold of the skin between the thumb and index finger of the left hand, so as to put it on the stretch, then he introduces the needle at the base of the fold at an angle of about 45°. This done, he lets go the fold of skin and steadies the canula of the instrument between the thumb and index finger of the left hand to guard against tearing of the tissues by any lateral movement, and with the right hand he expels the fluid by a rotating movement of the piston, or by pressing gently on the crown by which the piston is terminated externally.

If it is desired to inject the full contents of the syringe it must be done gradually, and it is also desirable to pause a few seconds at the fifth, tenth, and fifteenth divisions. The needle is withdrawn in the same direction in which it is inserted. It is necessary to apply the left index finger to the point of puncture, to prevent the escape of the fluid or its soaking into the skin.

Some authors, among others M. Le Moaligou, to prevent the fluid spreading to the deep surface of the skin where the vacuum is produced along the track of the needle, when it is quickly withdrawn, advise that slight pressure should be made for a few seconds above or below the point of puncture according to the direction in which the injection has been made—from below upward or from above downward.

It only remains to cleanse and if necessary to disinfect the instrument. To effect this it is always desirable to expel the last drops of fluid from the needle, and not to lay it aside without inserting the silver wire, or, better still, a pig's or boar's bristle.

If it is a matter of consequence to make use of well proportioned solutions, it is no less so to ascertain exactly the capacity of the syringe which is used. It must not be forgotten that, in spite of every care on the part of the instrument maker, syringes often differ from one another in their calibre.

To ascertain the capacity of a syringe, it should be weighed, first full of water and then empty; it should afterward be ascertained by successive weighings that it is of equal calibre throughout (we ascertain thus the quantity in weight of fluid which is expelled by a given movement of the piston), the syringe containing a definite quantity of water for a certain number of rotations of the piston or of degrees on the barrel.

The syringes which are in most general use contain as a rule one gramme of distilled water (twenty drops).

Local Accidents.—Like all other therapeutic measures, the hypodermic is not without its inconveniences. They arise sometimes from the drug itself or its excipient, at others they are due to the inexperience or awkwardness of the operator.

The puncture may of itself be a source of *pain,* which is always slight and transient if the point of the canula is sufficiently sharp and small. Generally this accident is due to the operator, either because the point of the instrument has not completely penetrated the skin, or because the fluid has been injected too suddenly, or again, because the instrument, badly inserted, has torn the fibres of the connective tissue, or has transfixed a nerve. *Want of cleanliness* of the canula, perhaps even of the operator, may give rise to serious troubles.

Slight *hemorrhage,* sometimes caused by the puncture, is of little consequence and may be disregarded. May the same thing be said of the introduction of the canula and subsequent injection into a vessel? As a general rule it may, if the fluid is free from turbidity and non-irritating, and if the dose of medicine injected cannot be productive of poisonous results; for we know that in such a case absorption cannot keep pace with elimination.

Injection of air as a rule is of little consequence. It is

quite otherwise, however, when fluid is *injected into the substance of the skin.* In this case, besides the pain and the resistance which is offered to the passage of the piston down the syringe, we observe an elevation of the epidermis, closely resembling urticaria spots, and leaving behind, sometimes, a *superficial scar.*

A frequent accident, of less importance than the rest, is *ecchymosis.* This casualty is frequently due to the too great force with which the injection is made, but even when the utmost precaution is used, ecchymosis may be produced in a subject whose skin is delicate.

Too large a quantity of fluid injected at one point may also be the cause of pain, ecchymoses, scars, abscess, etc.

Some advise that the needle should be introduced deeply into the cellular tissue and then slightly withdrawn to make a channel for the fluid, but this proceeding is of doubtful utility. It has also been advised to expel the injection at the level of the superficial fascia (between the subcutaneous tissue and the muscular aponeurosis), the theory being that the fluid injected in this way diffuses itself better, that the fascia is not so sensitive, and that, by adopting this plan, there is little danger of the fluid escaping by the puncture. The advice is good, but it is difficult to carry it into practice.

Another cause of *pain* is the use of injection fluid *at a lower temperature than that of the body.* To obviate this, it is well to make use of solutions the temperature of which is about the same as the body temperature. This precaution is not often observed, and, let us add, without any appreciable injury to the patient.

The escape of part of the injection is due either to negligence on the part of the operator, or to the use of a canula with too large a calibre.

If the *choice of situation* for making the injection is not without its importance in regard to absorption, it is not of less consequence in regard to those accidents which may supervene. As a general rule, the farther the injection is made from the trunk, the greater is the liability to local complications. Account must be taken, (1) of the irritation which the friction of garments, walking, manual work, etc., may cause at the punctured point; (2) of the greater or less looseness of the subcutaneous cellular tissue; (3) lastly, it is desirable to

avoid, unless for some special reason, (*a*) the neighborhood of great vessels; (*b*) highly innervated regions; (*c*) those parts where the skin is separated from the bone only by a thin layer of adipose tissue (as, for instance, over the internal surface of the tibia); (*d*) the immediate neighborhood of the joints, except in special cases.

Cachectic individuals, bleeders, diabetics and alcoholics, all subjects predisposed to sundry accidents, require the utmost care in the operative procedure. In another class of cases it is prudent to abstain from making hypodermic injections, or at least to use antiseptic precautions, as in instances of infectious disease, erysipelas, etc.

Accidents may arise from the powders, deposits, fungi, and crystals which may be formed in too concentrated solutions, which either exist from the first in the solutions or are developed later on. It is sometimes possible in this case to restore the solution to its original condition by heating it in a water-bath at the temperature of the body, but it must not be forgotten that too concentrated solutions of certain salts often give rise to inflammatory troubles. Finally, the medicine itself may be at fault, if it is only held in suspension, as in the case of calomel, or if it is little or not at all capable of being absorbed (accumulation of mercury [*emmagasinement*] of M. Luton).

Many solutions should be prepared when required; some may be kept an indefinite time by taking the precaution to add a few drops of salicylic or carbolic acid in solution.

We will not enlarge more on the accidents due to the irritating properties of the liquids or of the substances in solution. Full details will be found in the several notices on particular remedies, as well as in the sections on Local accidents and Solutions.

A few rare cases of *tetanus*, which were attributed to injections of sulphate of quinine, have been published, but these observations do not appear to be free from cavil.

Injections should never be made on the nose, ears, eyelids, different parts of the neck, scrotum, axilla, groin, fingers, etc., nor on œdematous regions or parts which are the seat of stasis, inflammation, or extravasation.

The local troubles which have occurred, more especially in the infancy of this method, have often been due to imperfec-

tions in the instrument employed, to undue size of the canula, to the irritating property of the drug, and to the faulty performance of the operation. All who have had considerable experience in hypodermic injections find that the number of these accidents diminishes with practice.

TO THE READEP

We thought it would be useful to devote a special paragraph to a resumé of the physiological effects of each drug. We have consulted the best works which have been published down to the present time, avoiding, as far as possible, controverted points. We have often had to quote facts which are as yet somewhat obscure; but we must remark that if, in such cases, our explanation is not quite satisfactory, the fault lies in the contradictory results obtained by various physiologists, either because the substances experimented on by them have not been chemically identical, more or less pure, or unstable, or, perhaps, because of the erroneous interpretation of physiological experiments. Vulpian says: "I have always, for my part, strenuously opposed this deplorable tendency to apply prematurely to pathology the still uncertain deductions of experimental physiology."

Many of the formulæ in this Manual must be entirely abandoned. Some leave much to be desired in regard to their composition, or, on the other hand, possess such irritant properties that they cannot be employed; others rank as poisons or have been insufficiently investigated; nevertheless, we did not deem it right to pass them over in silence, (1) because they possess an historic interest, (2) because they may throw light on future investigations.

In all quotations, to avoid responsibility, we have been careful to append the names of authors. When we have made original investigations we have stated our own results in detail. Finally, we are responsible only for a comparatively small number of formulæ.

We may make this general observation, that the practitioner should not depend merely on the normal physiological effects of poisonous solutions, but that he should also in each individual case, and above all in the case of alkaloids, bear in mind that a drug which is not eliminated may induce disas-

trous results: thus, the administration of active drugs in renal affections should be always guarded against.

We do not deny that, in spite of our utmost care, our undertaking is still imperfect, the field traversed by us embracing, as it does, nearly every therapeutic agent. In order that this work may be rendered more accurate we appeal to all our readers, and assure them that we shall welcome any correction, of whatever nature it may be, provided of course that it is well founded; corrections of names, dates, etc., as well as any criticism or communications regarding fresh discoveries, and we promise to find room for them, if possible, in a new edition.

We have purposely omitted any reference to injections which exert a purely local effect, to alterative interstitial or parenchymatous injections, which, properly speaking, do not fall within the scope of the hypodermic method. Intravenous medicinal injections, as well as injections into the serous and other cavities, and transfusions, do not find a place in this work.

ACIDUM ARSENIOSUM.

ARSENIOUS ACID. (*See Arsenium.*)

ACIDUM BENZOICUM.

BENZOIC ACID.

This acid is slightly soluble in cold water (1 in 200), more so in boiling water (1 in 15), in glycerin (1 in 10); very soluble in alcohol, ether, and oil of turpentine. [According to Squire, borax aids its solubility in cold water—one of borax and one of acid being soluble in 100 of water.—*Trans.*]

Principal Physiological Effects.—Arrests fermentation and putrescence. Is eliminated by the perspiration, saliva (as succinic acid), the kidneys (as hippuric acid), and the lungs (when the dose exceeds 15 to 30 grains).

In this dose (which is considerable) it gives rise to no remarkable phenomena. According to Schreiber, in doses of about four drachms, it induces feeling of weight in the head, increased rapidity of cardiac contractions, increased perspiration, and the expectoration of large quantities of mucus. (Benzoic acid is chiefly used as an expectorant and as an excitant.)

Local Effects.—The solution employed by Rohde caused great pain, but even the strongest solutions, in his hands, never gave rise to abscess or ecchymosis.

Formulæ.—The solution used by Rohde in a case of nephritis with threatened uræmia (1871) was as follows:—

Benzoic acid, ...	10 grains
Alcohol, ...	up to 112 minims.

Dose from 8 to 16 minims (about ¾ of a grain to a grain and a half of benzoic acid). Both solution and syringe should be warmed to a temperature of 95° F.

In a case of pneumonia with difficult expectoration, unconsciousness, stertorous breathing, cyanosis, small and frequent pulse, the same author obtained a rapidly favorable result from eight injections in one hour of this solution. About seven grains altogether were injected.

Alcoholic solution of benzoic acid (1 in 12),	
Alcoholic solution of camphor (1 in 12),	of each 12 minims
Alcohol, ...	up to 144 minims.

A syringeful or 16 minims repeated several times (Leyden and Rabow). The solution of camphor in the formula may be increased to 18 minims (Rohde).

We have had occasion to make use of this solution, as well as of the following, several times, neither of them seeming to excite any pain; but it is right to observe that we were treating a case of epilepsy with dementia, and it is probable that the sensibility was dulled. A solution containing equal parts of benzoic acid and camphor caused indurations which persisted for several days; and a solution of benzoic acid in equal parts of alcohol and water produced sometimes puffiness and redness of the skin, at other times abscess.

Benzoic acid, ...	25 grains
Alcohol, ...	160 minims
Distilled water, . . .	up to 320 minims.

Warm the fluid to 95° F., to insure complete solution of the benzoic acid, and inject, at intervals of five minutes, 64 minims in all of the solution (1¼ grains of benzoic acid in each syringeful, that is, 5 grains altogether).

Rohde has employed this solution without success in a case of uræmia.

Therapeutic Uses.—In pneumonia, typhus, uræmia, collapse, etc. Benzoate of sodium, which is soluble in two parts of water, appears to be possessed of more active properties than benzoic acid, but we do not think it has been administered hypodermically as yet. It has been administered in doses of four scruples to six drachms in diphtheria, phthisis, puerperal fever, etc. [Benzoic acid has been also recommended in the

treatment of chronic bronchitis, cystitis, and gout. See Brunton's "Pharmacology and Therapeutics," p. 880. Neale's "Digest," 393-5.—*Trans.*]

ACIDUM CARBOLICUM.

Carbolic Acid. Phenol.

Carbolic acid (C_6H_5HO) is a derivative of benzol, soluble in 50 parts of water (chemically pure acid is soluble in 20 parts, Binz, Hager), and in all proportions in alcohol, ether, bisulphide of carbon, and glycerin. Concentrated aqueous solutions can be prepared by mixing equal parts of carbolic acid and glycerin, when water may be added in any proportion.

Absorption is rapid even through the unbroken skin (Husemann, Hoppe-Seyler). Elimination is rapidly effected through the skin, lungs (with characteristic odor of the breath), and the kidneys. In the urine we find carbolic acid transformed into phenol-substitution products:—(*a*) if introduced into the body in small quantities,—under the form of sulpho-carbolic acid (phenol-sulphate), nontoxic; (*b*) if it has been injected in large doses,—in the form of another phenol-substitution product, the nature of which has not yet been ascertained (Baumann).

The urine, without necessarily being largely charged with carbolic acid (Salkowski), often assumes a grayish-green color, more especially after absorption from the skin or from a wound; sometimes, but rarely, there is albuminuria, especially after large doses.

Principal Physiological Effects.—Antiputrescent and antifermentative. In a dose of seven grains, it produces in man no serious result. In doses of from seven grains to half a drachm the effects are general excitement, then stupor, vertigo, humming noises in the ears, deafness, languor, sweats, diminution of the pulse rate, fall of temperture, colic, diarrhœa.

In poisonous doses, vertigo, giddiness, tingling in the fingers, intoxication, delirium, stupor, analgesia, anæsthesia, muscular debility, intermittence and then arrest of the heart in diastole; rarely convulsions, contrary to what we find in animals, collapse, coma, death.

Antidotes.—Saccharated lime (Husemann); sulphate of

sodium and other sulphates (Baumann); inhalations of oxygen, bleeding, transfusion (Ferrand).

Local Effects.—Sensation of burning, disappearing generally after half an hour; in moderately large doses (Hueter's two-per-cent solution) production of small ecchymoses, but without abscess.

Carbolic acid, ...	1 grain
Distilled water, . . .	up to 112 minims.

Dose, eight to sixteen minims = $\frac{1}{14}$ to $\frac{1}{7}$ of a grain of acid ("Formulary of Vienna Clinique").

Carbolic acid, ...	2 grains
Distilled water, . . .	up to 112 minims.

Hueter (erysipelas, four half syringefuls [32 minims] in the healthy skin round the erysipelatous spot), Hirschberg, Aufrecht, Schnitzler (phthisis), Fleischmann (prurigo eight to sixteen minims at the affected part:—one injection every second or third day: total number 3–15).

Carbolic acid, ...	1 grain
Distilled water, . . .	up to 80 minims.

This solution has been used in traumatic erysipelas; five or six injections of 16 minims are made into the healthy skin around the erysipelatous patch at a distance of 1 centim. (0.39 of an inch) from the red margin and at several points; they are repeated a second time in the same day, and the treatment is pursued until fever subsides and there is arrest of erysipelatous inflammation (duration 3 to 4 days). We have seen it employed with success at Strasbourg, in the practice of M. E. Bœckel. In an article published in the "Gazette Médicale de Strasbourg," May, 1875, M. E. Bœckel concludes by saying that these injections often allow of the arrest of severe attacks of erysipelas in two days. Nevertheless, he records in this same article one case of death.

Carbolic acid, ...	1 grain
or " "	3 grains
or " "	5 grains
Distilled water, . . .	up to 112 minims.

The above solutions have been employed by Jessier (1868) in cases of intermittent fever.

Sulphate of quinine, ...	1 grain
Sulphuric acid, ...	q. s.
Boiling water (!!), ...	90 minims.

Allow to cool and then add:—

Carbolic acid, ...	4 grains.

Lente has injected 18 to 24 minims and more of this solution without causing abscess. [The formulæ that appear to us most suitable, are those used in the cliniques, at Vienna, of Hueter, and especially of M. E. Bœckel. Five-per-cent solutions are too strong for hypodermic use.—*Trans.*] Carbolic and salicylic acids are in this way often employed to prevent decomposition of hypodermic fluids.

"Carbolate of ammonia" has been used as a hypodermic injection in typhoid fever (Déclat).

Therapeutic Uses.—Intermittent fevers (Jessier, 1868, 26 cases, 15 recoveries; Déclat, 1869, publ. in 1873; Hueter, Hirschberg, Aufrecht, Motta, who made injections into the back and splenic regions without general or local mishaps (25 cures, 8 failures. He preferred carbolic acid to sulphate of quinine, especially in hospital practice, etc.); prurigo (Rezek, Fleischmann); diphtheria (Trotz, etc.); phthisis and tuberculosis (Schnitzner, Eliacopulos); crural neuralgia, pleuro-pneumonia (Hagen, Kunze); various neuralgiæ (Schrumpf); typhoid fever (Déclat); diabetes, malignant pustule, carbuncle, malignant œdema (Raimbert, Méplain, Verneuil, Trélat (solution 1 in 50), Marchisio (1879). Giovannetti, Maffucci (1881), etc.); nævus (Badley); acute articular rheumatism (injections made in the neighborhood of affected joints; salicylic acid and salicylate of sodium *per os* are preferable to carbolic acid hypodermically. Bergonzini, Senator, Kunze and Goldbaum); puerperal diseases (Chiarleoni, unsuccessfully); anthrax (Olavide); Ludwig's angina (parenchymatous injection of 2-per-cent solution).

Skibnewsky's formula.

Carbolic acid, ...	1 part
Distilled water,	
Alcohol, ...	of each 2 parts.

ACIDUM HYDROCYANICUM. POTASSII CYANIDUM. AQUA LAURO-CERASI.

Hydrocyanic Acid. Prussic Acid. Cyanide of Potassium. Cherry-Laurel Water.

Hydrocyanic acid is soluble in water and alcohol in all proportions. Cyanide of potassium is readily soluble in water, in alcohol, and in glycerin (ab. 1 in 3).

Principal Physiological Effects.—Bitter taste, feeling of heat, burning, and then numbness of the tongue, pharynx, and stomach; salivation; increase in number of respirations, which become most painful; elevation of blood-pressure, slowing of the pulse, spasmodic phenomena.

In larger and poisonous doses, nausea, vomiting, cephalalgia, giddiness and fainting; difficult respiration (slow or frequent), dilatation of the pupils, lowering of blood-pressure and temperature, feeble then imperceptible pulse; general tonic and clonic spasms; sensory and motor paralysis; coma and death by asphyxia. Cyanide of potassium is much less potent than hydrocyanic acid; it possesses similar properties and is prescribed in doses of from one-seventh to three-quarters of a grain, cautiously increased to two and a half or three grains.

Local Effects.—Distilled cherry-laurel water possesses distinctly irritating properties [Messrs. Dujardin-Beaumetz and Lailler have never met with mishaps from the subcutaneous injection of cherry-laurel water; its irritating properties were found to be due to acidity from oxidation by contact with air]; cyanide of potassium even in very feeble doses (one per cent) gives rise to pain which is almost as severe as that which would be caused by the injection of an equal quantity of saturated solution of sodic chloride. It does not cause suppuration. Hydrocyanic acid has a somewhat irritating action similar to that produced by morphine. Cherry-laurel water, recommended by Luton, is chiefly used as a vehicle for hypodermic solutions (see atropine, morphine, etc.); it forms perfectly clear solutions with morphine which will keep an indefinite time. Cherry-laurel water of the German pharmacopœia contains one part of hydrocyanic acid in 1000; that of the French pharmacopœia less than half that quantity. Dr. Bartholow has used prussic acid of the United States pharmacopœia

hypodermically in doses of two to four drops. He thinks that four drops is too large and even a dangerous dose, and that it is prudent not to exceed that of two drops, which, however, may be repeated frequently, owing to the rapid elimination of the acid.

Hydrocyanic acid (2%), . . .	10 minims
Distilled water, ...	60 minims.

From two to six minims.

Cyanide of potassium, ...	1 grain
Distilled water, . . .	up to 112 minims.

Therapeutic Uses.—Mental diseases, especially puerperal mania (Macleod) [this author made use of Scheele's acid. French hydrocyanic acid for medicinal use is 1 per cent. —*Trans.*]; mania and melancholia (Macleod, Bartholow); eclampsia (Macleod); angina pectoris, gastralgia, functional vomiting (Bartholow). Cherry-laurel water, in doses of half a drachm, has been injected in lumbago by Estachy. [32 minims of aqua lauro-cerasi of the French Codex = 16 minims of the British pharmacopœial preparation, or about $\frac{4}{5}$ of a minim of the Acid. hydrocyan. B.P.—*Trans.*]

Antidotes.—Preyer has asserted that atropine is a physiological antidote to prussic acid. The experiments of Bartholow do not support this view. [Inhalaton of ammonia was shown to be an antidote, as far back as 1822, by Murray, but it is of little or no use administered by the stomach. I would suggest that it may be an efficient antidote administered hypodermically or by intravenous injection. *See* Christison "On Poisons," 4th edit., p. 777.—*Trans.*]

ACIDUM OSMICUM.

Osmic Acid.

This acid, originally employed in the treatment of tumors by interstitial injection (Winiwarter, Delbastaille, etc.), has been employed by Billroth, Neuber, Eulenburg, Lipburger, Merces, and others, in the treatment of obstinate neuralgia with various results.

Osmic acid, crystallized, . . .	1 grain
Distilled water, . . .	up to 112 minims.

The solution should be kept fresh in a vessel of black glass or of lead. Prof. Eulenburg has not met with any instance of local or general disturbance from its use, but other authors have reported gangrene of the skin, œdema with greenish discoloration, etc.

Dose.—Eight to sixteen minims of this fluid may be injected = $\frac{1}{14}$ to $\frac{1}{4}$ of a grain.

ACIDUM PHOSPHORICUM.

Phosphoric Acid.

According to M. Michalski (Thèse de Paris, 1868), phosphoric acid has been employed hypodermically in the treatment of the hæmoptysis of phthisis.

ACIDUM SCLEROTINICUM.

Sclerotinic Acid.

Sclerotinic acid, isolated from ergot of rye by Dragendorff and Podwissotzky, is a brown substance without taste or odor, faintly acid; it is hygrometric but is not deliquescent. The chief symptoms observed by Nikitin[3] after the administration of sclerotinic acid, which acts chiefly on the central nervous system, were paralysis, lowering of blood pressure, and enfeeblement of cardiac contractions (in cold-blooded animals); in acute poisoning, fall of temperature continuing until death; slowing of respiration and its total arrest, in the event of death, before cessation of circulation; in warm-blooded animals increase of peristalsis. Nikitin found, moreover, that sclerotinic acid induced uterine contractions, whether there was pregnancy or not, and strengthened already existing contractions. Before and during contractions he observed discoloration of the uterus. He attributes the hæmostatic action of sclerotinic acid in pulmonary hemorrhage to diminution of blood pressure, while, in uterine and intestinal hemorrhages, he thinks the same result is due to anæmia produced by vascular constriction which follows upon injection of the acid.

Rennert used it for hypodermic purposes in an aqueous solution of 1 to 2. These injections, he says, are extremely painful. The solution which M. Prévost of Geneva used, was composed as follows:—

Sclerotinic acid,	3 grains
Glycerin,	44 minims
Distilled water,	up to 112 minims.

More recently M. Prévost has substituted with advantage carbolic acid for glycerin; the solution thus made keeps good an indefinite time. The formula is subjoined:—

Sclerotinic acid,	3 grains
Carbolic acid,	½–1 grain
Distilled water,	up to 12 minims.

In 1882 we employed this solution at the Bicètre in the treatment of epilepsy in a certain number of cases; in doses of ½ to 4½ grains by hypodermic injection, the maximum dose being 9 grains, we observed neither local nor general accidents, and the pain was nil. The therapeutic results were negative in nearly all the cases; in five patients we observed slight amelioration. The duration of treatment varied from six months to a year.

In these formulæ the Pravaz syringe of one gramme (16 minims) contains ¾ of a grain of sclerotinic acid; which is the quantity which Dragendorff and Podwissotzky indicated as the adult human dose.

According to the researches of Nikitin, the smallest dose which produced uterine contractions in animals was 0.2 gramme (3 grains). The same author states the fatal dose for man at 155 grains.

Stumpf, in the clinique of Ziemssen at Munich, at first employed sclerotinic acid in the doses recommended by Dragendorff and Podwissotzky, but finding this dose insufficient he raised it to 9 grains, repeated at the most 3 or 4 times a day (6-per-cent aqueous solution) by hypodermic injection. Kobert has administered sclerotinic acid in a dose of 16 grains daily. M. Sotschaw (1881) stated that he had obtained better results in uterine fibroma from the use of sclerotinic acid, in 5-per-cent solution, than from the injection of ergotin.

Recent experiments by M. Queirolo ("Italia Medica," 1884, No. 25) show that sclerotinic acid in doses of from ¾ grain to 2¼ grains hypodermically, or ʒ ss. to ʒ i. by internal administration, exerts no action on vascular calibre and does not increase the pulse rate. Ganguillet employs sclerotinate of sodium.

Therapeutic Uses.—The indications for the use of this drug are the same as those for ergot of rye and ergotin.

[*A propos* of this subject see two important papers on the principles of ergot by Dr. Kobert of Dorpat.[4] He describes 3 active principles in ergot, viz., ergotinic acid, sphacelinic acid, and cornutin. (1) Ergotinic acid is the active principle of Bonjean's extract, of Wernich's dialyzed ergotine, and of the sclerotinic acid of Dragendorff and Podwissotzky. It is 5 times as powerful as sclerotinic acid. Hypodermically injected it causes paralysis—beginning in brain and spinal cord—paralysis of vaso-motor centre, and lowering of blood pressure. In the largest doses it causes no uterine contractions, and it does not cause gangrene. About 90 per cent escapes absorption. It is a glucosidic acid. (2) Sphacelinic acid in poisonous doses induces death with symptoms of gangrene. (3) Cornutin is not to be confounded with the ergotinine of Tanret. The latter is quite inert. The former induces uterine contractions both in pregnant and in non-pregnant animals; in non-pregnant animals it also causes vomiting, diarrhœa, and irregular pulse. Abortion could always be produced in dogs and cats by injection of cornutin ($\frac{1}{8}$ grain) without risk to the mother.

Cornutin acts reflexly on the uterus through a spinal centre; sphacelinic acid acts directly on the uterus itself. The latter in sufficient doses never failed to lead to expulsion of the fœtus in dogs and cats, and none of the mothers died. Kobert adds that the only rational preparation of ergot is one which contains all the cornutin and sphacelinic but no ergotinic acid; for the latter is very injurious to the stomach, and has no action on the uterus.—*Trans.*]

ACIDUM SULPHO-ICHTHYOLICUM. (*See Ichthyol.*)

ACIDUM TANNICUM.

Tannic Acid. Tannin.

Tannin has been used as a derivative by Messrs. Luton and Schwalbe in doses of from 16 to 32 minims of a 1 in 10 or 1 in 5 solution. Iodo-tannate solutions, which have been recommended by Guilliermond in the treatment of varix, are not within the scope of this work.

[A series of interesting and important researches have recently been carried out by Messrs. Arthaud and Raymond, on the etiology and treatment of tuberculous diseases. Six rabbits were treated for a month with doses of eight to sixteen grains of tannin. "In spite of two successive inoculations, one affected with pulmonary substance taken from a guinea-pig which had died from acute tuberculosis, the other inoculated with miliary tubercles from a hospital patient, no trace of infection was observed, while three other rabbits to which tannin had not been given succumbed in consequence of the inoculations." In consequence of these results, over fifty tuberculous patients were treated with considerable doses of tannin with the most encouraging results, and it has been concluded that patients under the influence of the tannin treatment show increased resistance to the tuberculous virus. Assuming the accuracy of these results and of the deductions drawn from them, it would appear as if some tangible benefit might be derived from the treatment of phthisis by hypodermic injections of tannin; —nay, more, it does not seem unreasonable to surmise that some part at least of the benefit accruing from the administration of tannic and gallic acids in the treatment of hæmoptysis, may find its explanation in something above and beyond the astringent action of these drugs.—*Trans.*]

ACONITUM. ACONITINA.

Aconite. Aconitine and its Salts.

Aconitine occurs in two forms, viz., amorphous and crystallized; it is inodorous, has a bitter taste, is insoluble in glycerin, slightly soluble in water, soluble in acidulated water, alcohol, ether, chloroform, benzol. All its salts, especially the sulphate, are freely soluble in water.

Principal Physiological Effects.—Slowing of pulse and respiration, shooting pains in the first division of the 5th nerve; pricking and tingling sensations of the skin, especially of the face, round the nose, of the lips and extremity of the tongue; alteration of the sense of taste (saccharine substances recognized with difficulty); noises in the ears, vertigo, debility and languor.

In Larger Doses.—Intensification of these symptoms—

sense of burning at tip of tongue, feeling of cold, of constriction of extremities, languor, somnolence, sense of weight in the head, pupillary dilatation, increase of urinary secretion, of sweat and of saliva; tendency to syncope.

In Poisonous Doses.—Nausea, vomiting, convulsions, fibrillary muscular twitchings, loss of the reflexes, motor incoördination; extreme prostration, complete anæsthesia, steady fall of temperature and pulse; inaudible voice, muscular paralysis and disappearance of muscular contractility coincidently with loss of motor nerve power (Mary, Thèse, 1880; this opinion contradicts the experimental results obtained by Aschscharumow, Bohm, Gréhant and Duquesnel, Rabuteau, etc., who attribute to aconitine an elective affinity for the terminations of the motor nerves; in small doses, according to these authors, aconitine resembles in its action that of curare in large doses; it acts primarily on the heart [arrest in diastole]); coma and death by asphyxia.

The *preparations* of aconite are very untrustworthy and their results are most uncertain; this uncertainty depends on the source of the drug and on the part used (preparations made from the fresh root are more active). Duquesnel's aconitine is the most active; the *amorphous* German aconitine is 20 to 50 times less powerful.

In consequence of a case of poisoning, followed by death, from Petit's (Paris) nitrate of aconitine, Messrs. Plugge and Huisinga undertook experiments to determine the toxic power of various samples of aconitine nitrate. The nitrate of Petit, in white crystals, was hard and difficult of solution in cold water; that of Merck, a yellow-brown powder, was easily soluble in water; that of Friedländer in thick gummy masses, of grayish-white color, was freely soluble in water. Their experiments showed that Petit's aconitine was 8 times more poisonous than Merck's, and one hundred and seventy times stronger than that of Friedländer. The German samples of aconitine, moreover, were not always of the same quality.

Aconitine and its salts should only be used with the utmost caution. The first dose should be no more than $\frac{1}{260}$ to $\frac{1}{130}$ of a grain, should scarcely ever exceed $\frac{1}{32}$ of a grain, and only with the utmost caution may be increased to $\frac{1}{13}$ of a grain (!) by degrees in cases where there is no sign of toxic effects.

[Martindale and Westcott [5] give the following scale of doses

for internal administration—$\frac{1}{240}$ to $\frac{1}{60}$ grain—may be carefully increased up to $\frac{1}{24}$ of a grain. They recommend English aconitine (Morson's) which is intermediate in strength between Petit's, the strongest, and Friedländer's, the weakest.[6] Their formula for hypodermic use is subjoined.—*Trans.*]

Antidotes.—Richardson has used with success hypodermic injections, and Wood has used, unsuccessfully, intravenous injections of ammonia in aconite poisoning. Finally, "even when the cardiac contractions are gravely affected or have actually ceased, it is possible to re-establish them by the artificial stimulus of electricity."—(Mary.)

Local Effects.—An alcoholic solution of sulphate of aconitine (1 in 500), first employed by Gubler, produces an intense sensation of heat, and occasionally a sense of burning which persist for a considerable time. This local action doubtlessly depends on the nature of the vehicle used for the solution.

Aconitine,	1 grain
Sulphuric acid,	a sufficiency to effect solution
Distilled water,	up to 560 minims.

Sixteen minims = $\frac{1}{35}$ of a grain of aconitine.

Nitrate of aconitine,	$\frac{1}{2}$ grain
Distilled water,	up to 1120 minims.

Sixteen minims = $\frac{1}{70}$ of a grain of the salt (Gubler, Mary). Erlenmeyer has used without success the following solution:

Aconitine,	2 grains
Alcohol,	140 minims
Distilled water,	up to 280 minims.

Each minim = $\frac{1}{140}$ of a grain.

Alcoholic extract of aconite,	1 grain
Distilled water,	up to 64 minims.

Lorent uses this solution in doses of from 4 to 10 minims in rheumatic cephalalgia.

[The following is Martindale and Westcott's formula—

Aconitine (English),	1 grain
Diluted sulphuric acid,	q. s.
Distilled water,	to $\frac{1}{2}$ fluid ounce.

Dose one to four minims.—*Trans.*]

Therapeutic Uses.—Neuralgia—especially of the trigemi-

nal (Gubler); cephalalgia (Lorent, Oulmont, Massini); acute (rendered superfluous by the introduction of salicylic acid) and chronic rheumatism (Lorent, Eulenburg); arthritis deformans (Lobl); prosopalgia (Pletzer); angina pectoris; whooping cough, etc.

Aconite and its preparations have, moreover, been recommended and used in cardiac hypertrophy, tetanus (Wunderlich), intermittent fever, and puerperal fever. In Geneva it is largely used at the beginning of certain acute affections of the respiratory organs, but to the best of our knowledge it has not been used hypodermically by any practitioner except Lorent, who administers the alcoholic extract.

ÆTHER.

Ether (so-called "sulphuric")

Including remarks on Acetic and Nitric Ethers and on Spirit of Ether or Hoffmann's Anodyne.

Ether (ethylic ether, often misnamed "sulphuric" ether), is soluble in nine parts of water and in all proportions of alcohol.

Principal Physiological Effects.—In moderate Doses.—Elevation of temperature (the rise being more marked the lower the temperature of the body before injection, Dupuy), increase of arterial tension, of pulmonary combustion, of all secretions except the urinary (Ocounkoff), excitement, exaltation of the senses and of cutaneous sensibility, dilatation of the pupils. Anæsthesia by hypodermic injection is only produced by a much larger dose than that required by inhalation, and then the opposite effects to those described above are observed.

In dogs the dose required to produce anæsthesia varies from 1½ to 3 ounces, according to the animal's weight (Ocounkoff).[7]

Local Effects.—Momentary but excessively acute pain, without, however, inflammation or subsequent suppuration (Luton, who has met with abscess in a case of severe variola, but it is the only known case of the kind); sometimes the pain is absent (Dupuy). M. Luton and later M. Henrot (typhoid fever with hyperpyrexia) have observed at the point of puncture a circumscribed subcutaneous emphysematous swelling, due

to the evaporation of the ether, which has a boiling point of 36° (96.8° F.). According to M. Luton absorption is not too rapid, but all the facts reported by other authors are opposed to this opinion.

After injections of ether, disturbances of motion and sensation have been observed (Arnozan and Salvat, Charpentier, Remak). The etiology of these accidents is still obscure, nevertheless Messrs. Arnozan and Salvat believe, from their experiments, in the existence of a neuritis. It follows from the great diffusibility of ether that the injection should not be too large, should not be repeated a second time at the same point, and should not be pushed beyond the cellular tissue.

Doses.—Sixteen to thirty-two minims, or even less, often suffice to produce a stimulant action (Dupuy). The action of ether being eminently transient, the injections should be repeated at short intervals (*e.g.*, of an hour) to obtain the phenomena of excitement.

Spirit of ether (Hoffmann's anodyne) has been used as an analeptic by Zuelzer, and *acetic ether* by Bumüller.[8] [The spirit of ether of the *Germ. Pharm.* is merely a solution of ether in alcohol, and contains no oil of wine, as does the compound spirit of ether of the U. S. P.—R.]

Ether in combination with camphor has been injected subcutaneously by Messrs. Eulenburg (collapse due to facial erysipelas), Mader and Oser (cholera). M. Burdel has combined it with sulphate of quinine, 6 grains to 16 minims, in severe cases of pernicious intermittent affections. M. Zuelzer appears to have been the first to make use of subcutaneous injections of ether (1866) in choleraic patients, and, in 1871, in patients suffering from adynamic typhoid. Since then it seems that numerous authors have used ether hypodermically. Ether has thus been employed among others in the following diseases: typhoid fever, algid stage of cholera (Hans Böchner, 1873, Dupuy, Lindwurm, Reyher and Lermoyez), profound coma with coldness (92.5° F.) due to obstinate and excessive hemorrhage after extraction of a naso-pharyngeal polypus (Verneuil), in poisoning by morphine and chloral (Lewenstein), in sciatica and lumbago (Brindley James), in dropsies (fatty heart), in convulsions followed by coma in a child at the beginning of pneumonia (Gellé), cholera nostras (Cérenville, Dufour, Leube), traumatic shock (Bayr, 1874, Dupont), variola (Luton, Du

Castel, Dreyfus-Brissac), lipothæmia as a result of repeated puerperal hemorrhages (Bayr, Letulle, Peter and Verneuil), poisoning by aconite (Warington, Howard), hemorrhages (Weir Mitchell, Ortille, Hecker, etc.), pelvic peritonitis complicated with obstinate vomiting and alarming collapse (Schmeltz), *post-partum* hemorrhage (Macau, 1876), hemorrhage due to mal-insertion of placenta (Lombe Atthill, Chantreuil, who combined it with cognac), ovariotomy followed by depressed temperature (Olshausen), in impending death (Amalai Gimeno, 1880), as an adjuvant to chloroform narcosis (Fritsch). Messrs. Bayr, Verneuil and Mlle. Ocounkoff have proposed injections of ether as a substitute for transfusion of blood in hemorrhages. M. Hayem, on the other hand, is in favor of transfusion with non-defibrinated blood. According to this author, injections of ether are only indicated in cases of syncope or prolonged lipothæmia.[9]

In short, excellent results are obtained from the diffusible action of ether in patients in a condition of extreme adynamia (Dupuy), of complete collapse (Zuelzer, Winckel, Osterlah, etc.), coma (Verneuil), lipothæmia (Letulle), asystole (Huchard, Bellardinelli).

Ether is also frequently used with advantage as a vehicle and solvent (*e.g.* for hydrate (not sulphate) of quinine, etc.). We have had the opportunity of examining in the cadaver the results produced locally on the cellular tissue by injections of ether; we found a small ecchymosis of slight extent affecting nearly the entire thickness of the adipose tissue. Ether has been injected interstitially in the treatment of wens by M. Vidal (5 to 10 minims every two days).[10]

[See a paper by Dr. T. More Madden on uterine hemorrhage and the hypodermic injection of ether in the "Brit. Med. Jour.," 1880, vol. i., p. 592. Dr. Madden in the same volume, p. 997, draws attention to the fact that ether dissolves the cement by which the joints of the syringe are secured, and describes one devised by himself in which "the screw is cut on the cylinder, which is graduated, and the instrument is so arranged that it may either be used for throwing in a large dose of ether by a single movement of the piston, or for the gradual injection of the smallest quantity of any other fluid."—*Trans.*]

AGARICINUM.

Agaricin.

Agaricin, obtained from Agaricus albus, has been extolled by Seifert, Piering and others, by whom it has been used to check excessive perspirations (phthisical and others) in doses of from $\frac{1}{14}$ to $\frac{2}{4}$ of a grain. It diminishes the frequency of the cough without inducing either nausea or diarrhœa. Sleep is more tranquil and uninterrupted. As its maximum of activity is only attained 5 or 6 hours after administration, it is necessary to give it at various times according to the nature of the disease under treatment. M. Seifert[11] has sometimes employed it hypodermically.

Agaricin, ...	1 grain
Absolute alcohol, ...	90 minims
Glycerin, ...	up to 224 minims.

An entire syringeful = $\frac{1}{14}$ of a grain, may be used at one time. Seifert discourages the use of agaricin hypodermically, because of the intense burning sensation which it causes, and also because it offers no advantage over administration by the mouth.

The doses recommended by M. Seifert have since been exceeded by several observers, but the results obtained were not constant. This substance is of much less therapeutic value than atropine.

[See an interesting paper by Dr. Murrell on Agaric in the "Practitioner," vol. 29, p. 321. Administered *per os* it is very apt to induce intractable diarrhœa. Dr. Murrell has found it of use in some cases of hæmoptysis.—*Trans.*]

ALBUMEN.

(*See Injectiones Nutrientes Hypodermicæ.*)

ALCOHOL.

Alcohol has been used hypodermically both by itself and also as a vehicle. Without speaking of its use in surgical operations on certain tumors or cavities, alcohol has been largely used as a diffusible stimulant (Zuelzer), in the treatment of local pains (Luton), or as a hæmostatic (Luton). We

have not found it superior in action to a saturated solution of sea salt. It produces at the point of contact a smarting sensation which speedily subsides. For hypodermic use, alcohol at a temperature of 90° F. is best. At a higher temperature there is risk of burning the tissues, and, even at this temperature, if the injection is made too near the extremities, there is the same risk. At a lower temperature the fluid tends to diffuse, and its local effects are proportionately less intense, but then one is administering a stimulating injection with a general action. The doses must be calculated according to the results that are aimed at; no definite dose can be fixed (Luton).

Alcohol injected under the skin is a good rubefacient, and particularly so at a temperature of 122° F. Its contact is not very painful and it produces neither abscess nor sloughs.

Flood made more than 200 injections of whiskey and coffee in four hours in a case of opium poisoning with complete success; at the same time he injected belladonna tincture in doses of 10 to 20 minims. Ainsworth (1881) injected half a drachm to a drachm of brandy in cases of collapse. [Edward Warren used hypodermic injections of brandy in 1867.] Breisky and Figuero injected brandy with good results in cases of acute anæmia due to puerperal hemorrhage or traumatism. In short the principal indications for the use of alcohol are found in severe cases of anæmia, in collapse, and in localized pain.

ALCOHOL AMMONIO-ANISATUM.

Ammoniated Alcohol with Anise. Ammoniacal Solution of Anise.

Zuelzer, of Berlin, has combined alcohol with ammonia in the following formula:

Oil of anise, ...	10 minims
Alcohol, 85%, ...	40 minims
Water of ammonia, . . .	50 minims.

Fifteen to thirty minims of this solution in adynamic typhus. He has observed sometimes small abscesses as a result of this injection. Eulenburg has employed injections of ammonia and anise with slight success in several cases of collapse; he injected 5 to 7 drops of ammoniated solution of anise, sometimes by itself, at others mixed with an equal quantity

of distilled water. We have used this injection twice only, but without local troubles.

ALOE. EXTRACTUM ALOES. ALOINUM.

Aloes and its Extract, Aloin.

M. Luton has had occasion to make use of a watery solution of aloes. This was a solution of one-tenth and contained only those principles that are soluble in water.

Aloes, ... 10 grains
Distilled water, . . . up to 112 minims.
Filter.

16 minims = $1\frac{1}{2}$ grains.

The local effects were almost nil or limited to a simple local hyperæmia which speedily vanished. The injection produced a decided laxative effect on a patient suffering from constipation in typhus; sixteen minims were injected under the skin of the fore-arm. An alcoholic preparation, or better still, one made with glycerin, would be preferable to that made with water. Solutions of the extract of aloes are of no use owing to the local irritation which they produce.

The aloin of Merck, a glucoside soluble in water and alcohol (Stenhouse),[12] has been employed by M. Fronmüller in aqueous solution (1 in 25), as a cathartic, without any local disturbance; its action is obtained in from 3 to 5 hours, except in cases of obstinate constipation. M. Fronmüller thinks that it is indicated in cases of gastric catarrh, cancer, and insanity. Aqueous solutions of extract of aloes and decoctions of senna cause local inflammation.

Dr. Klein alleges that aloin diminishes inflammation and intraocular pressure in glaucoma, acute keratitis, etc. Subcutaneous injections of aloin and of watery extract of aloes have been administered, hitherto without success, by Kohn[13] in the constipation of insanity. After the injection of strong doses of aloin in animals he observed a hemorrhagic ulcerative gastritis, and changes in the kidneys resembling those which ensue on poisoning by chromium salts. M. Hiller has experimented with a solution of 16 grains of aloin in 48 minims of warm glycerin; one to two syringefuls of this solution at one time produced, 5 to 6 hours afterward, a moderate purgative

action with abdominal pain. M. Bozzolo, of Turin (1883), was compelled to abandon these injections owing to the severe local disturbances to which they gave rise.

AMMONIÆ AQUA.

LIQUOR AMMONIÆ. FLUID AMMONIA. WATER OF AMMONIA.

Ammonia has been used hypodermically along with its internal administration, in the treatment of bites by venomous serpents; 30 minims diluted with an equal quantity of water, or, better still, one part of ammonia with four parts of water (Nothnagel and Rossbach). Dr. Willis Cumming has used ammonia injections in a case of alcoholism complicated with sunstroke (1883). Halford and Oré have practised intravenous injections of diluted ammonia in severe cases of serpent bites. [The translator has used 4 minims of liq. ammoniæ with 6 of water by intravenous injection in syncope from uterine hemorrhage in several cases with marked and immediate benefit.]

Monteverdi has used it with equal parts of peppermint water in a severe case of cholera, and this treatment was successful. M. Trusevich has used water of ammonia in cases of collapse, both by hypodermic and intravenous injection (2 to 5 minims of dilute ammonia). These preparations had previously been used by Halford, Penfold, Moceiben, Tibbis, Davidson, Cotton, Flint, and others. M. Hirsch, of Mayence, has used injections of sulphide of ammonium (Schwefelammonium) in the treatment of cholera. This author asserts that he has used it with success, but the theory upon which his treatment was based is quite untenable.

Liq. ammonii sulphidi, ...	1 dr.
Aquæ destillatæ, ...	3 drs.

A solution of equal parts produced sharp pain (sense of burning lasting an hour) and inflammatory phenomena.

Richardson, in a case of poisoning by tincture of aconite (see ACONITE), made an injection of ammonia after the pulse had ceased for ten minutes. This injection (about 40 minims) was repeated 4 times at intervals of ten minutes; four days afterward all trace of poisoning had disappeared. There was observed at one point of injection a small patch of sloughy skin.

Valerianate of ammonium has also been used hypodermically.

Ammonia and its salts are characterized by such excitant and stimulant properties that they are of the greatest service in the treatment of collapse in the most diverse diseases.

AMMONIUM, CITRATE OF.

(*See under Ferrum.*)

AMYL NITRIS.

Nitrite of Amyl.

Nitrite of amyl has generally been used in the form of inhalations.

The results obtained from its use by subcutaneous injections are uncertain (Amez-Droz). From 16 to 80 minims have been injected in the dog, and 90 minims in man in one and a half hours.

On post-mortem examination of animals which have been subjected to injections, nothing abnormal could be found, with the exception of a grayish discoloration (Guttmann); there is no suppuration. Dr. David B. Smith was the first, so far as we know, who administered amyl nitrite hypodermically in man. The case was one of cholera, a disease in which Hayden and Cruise had previously given inhalations of amyl without apparent benefit. Dr. Smith's patient died.

Nitrite of amyl, ...	10 minims
Alcohol, ...	90 "

(*Barnes.*)

Eight to twelve minims in lumbago. Dr. Barnes asserts that he has obtained the same physiological effects by hypodermic injection as by inhalations.[14]

Dr. Sidney Ringer mentions the case of a woman affected with chronic mania in whom Dr. Strahan injected 8 minims of a 10 per cent solution of amyl for the relief of lumbago; this was followed by two epileptiform attacks in close succession.[15]

[Dr. Barnes[16] advocates the use of amyl nitrite by inhalation (not by mouth) in cases of strychnine poisoning, and he attaches great value to its power of arresting, or, at least, controlling, diastalsis. He also recommends the use of this rem-

edy to subdue irregular and excessive action of the uterus, to overcome hour-glass contraction of the uterus, and to control puerperal convulsions.

Should unpleasant symptoms follow the subcutaneous administration of amyl nitrite, the antidote (used successfully in Dr. Strahan's case) is chloroform by inhalation.—*Trans.*]

ANTIHYDROPINUM.

Antihydropin.

Antihydropin is obtained from the Blatta Orientalis (cockroach), and is used by the Russians for dropsy. It has been administered hypodermically by Wyschinski, but with negative results. M. Bogomolow has used it both in powder and in tincture in 70 cases of anasarca and ascites (cardiac, renal and hepatic affections); in 19 cases there was profuse perspiration, in 61 there was increase of urinary secretion, and in 13 cases catharsis, without irritation or other ill-effects, was induced. In uræmia the author injects a syringeful (Pravaz) of tincture.

ANTIMONII ET POTASSII TARTRAS.

Antimonium Tartaratum. Tartar Emetic. Tartrate of Antimony.

Soluble in water 1 in 15, in glycerin 1 in 18, insoluble in alcohol.

Principal Physiological Effects.—In small doses.—Administered every day for 14 days (experiments of Meierhofer and Nobiling on themselves) in doses progressively increased from $\frac{1}{10}$ to $\frac{1}{4}$ grain. Sense of weight in the head, debility, thirst with feeling of inward heat, drowsiness, frequent and irregular pulse, vertigo, pallor of face, ringed eyes, and dysphagia. Loss of appetite, sense of epigastric heat, frequent intestinal pains, nausea, anxiety, yawning, dyspnœa, painful abdominal sensations, diarrhœa or constipation, chilliness of the skin, feeble heart beats, general prostration and emaciation. In doses of $\frac{1}{4}$ grain continued for several days, eructations, efforts to vomit, frequent stools, increase of hepatic dulness with pain, colic and griping, itching of the skin, albuminuria, emaciation amounting to 12·4 ounces in $\frac{1}{2}$ to 14 days.

The poisonous phenomena only disappear finally after two months.

In large doses (one-and-a-half grains and upward) there are symptoms of gastro-enteritis, prostration, thread-like pulse, which is also frequent and irregular, superficial respiration, cold sweats, cyanosis and death (rare in this dose, especially if the heart is healthy) from paralysis of the heart. Pustular eruptions, ulcerations and scars supervene on application to the skin.

Local Effects.—Very acute local inflammation with one-third of a grain, phlegmon and lymphangitis (Lehmann), with half a grain, syncope and phlegmon (Ellinger). Lissauer has also observed phlegmons after hypodermic injection of tartar emetic, but this salt if combined with morphine only gives rise to trifling, and sometimes to no local ill effects.

Tartrate of antimony and potassium,	1 grain
Morphine (tartrate ?), . . .	$\frac{1}{6}$ grain
Distilled water, ...	up to 64 minims.

16 minims = $\frac{1}{4}$ grain of antimony.

(*Lissauer.*)

Therapeutic Uses.—It may really be said that tartar emetic is hardly ever indicated except as an emetic. It has been used by various authors (Lehmann, Ellinger, etc.); it has been combined with morphine by Lissauer who recommends it in cases of poisoning where antimony cannot be administered by the stomach.

ANTIPYRINA.

Antipyrine.

An artificially prepared organic base (phenyl-dimethyl-pyrazolon) derived from *pyrazol*, according to Knorr. Antipyrine appears in the form of white crystalline powder, of a grayish-yellow color after exposure to the air, soluble in 1 part of cold water, and in alcohol. It has a slightly bitter taste, and scarcely any odor.

A powerful antipyretic, its properties are identical with those of kairine, but its action is both more intense and more prolonged, and it produces no alteration in the blood (Huchard, Brouardel and Paul Loye, Arduin); in the period of reaction

there is no sign of rigors, that is, when the temperature increases again. It produces sometimes a moderate amount of perspiration [according to M. Huchard sweats do not occur when the antipyrine is given in divided doses (7 to 8 grains], vomiting, pharyngeal constriction, and a peculiar exanthem (Pribram, Cahn, and others), but collapse has never been noticed. Antipyrine is possessed of antiputrescent and hæmostatic properties (Arduin, Hénocque). Elimination is by the kidneys, and it may be detected 36 hours after its administration (Maragliano).

Antipyrine arrests the fermentation of yeast, and germination (Brouardel and Paul Loye).

The different results obtained are probably due to varying samples.

Doses.—M. Filehne, who first experimented with antipyrine, gave it in doses of 75 to 90 grains in three instalments at intervals of an hour; other authors have given as much as 135 to 155 grains. It is, however prudent only to increase the dose by degrees in case of any accident from collapse. In children, Messrs. Penzoldt and Sartorius advise to give at first every hour as many decigrammes as there are numbers of years (a decigramme = $1\frac{1}{2}$ grains). The antipyretic effect would be more rapid and intense after hypodermic administration.

Used by a great many observers, it has chiefly been employed in the treatment of the symptom "fever;" Ranke (1884) was the first to use it hypodermically; he injected from 1 to $1\frac{1}{2}$ c.cm. (16 to 24 minims) of solution of one gramme (16 grains) of drug in 8 minims of water. The solution when warmed retains its limpidity after cooling. Made in the gluteal region these injections only cause transient pain without any inflammatory reaction.

Erb, Hoffer, Huchard, Niepce, Mingazzini, Roussel, and Pavay also used hypodermic injections. The first three gave them up on account of the intense pain they caused, the others still continue to recommend them. The solution of M. Mingazzini contains 16 grains in 48 to 64 minims of distilled water; that of M. Huchard is composed of equal parts. The latter has found that the hypodermic method is somewhat painful; in his opinion it yielded less satisfactory results than that by internal administration.

M. Pavay used a 50-per-cent solution; he has injected three Levin syringefuls (capacity 40 minims) in one hour, or 54 grains of antipyrine. The effects are rapid. After each injection he manipulates for a few minutes the injected part (the gluteal muscles). He has never met with local accidents (sensation of burning, pain, or inflammation); he thinks, moreover, that these injections should invariably be resorted to when from any cause administration by the mouth is inadmissible.

[More recently, antipyrine has been largely used hypodermically as an analgesic and anodyne, in place of morphine, or where this agent was contra-indicated.]

APOCODEINA AND APONARCEINA.

Apocodeine and Aponarceine (Salts of).

Hydrochlorate of apocodeine (apocodeine differs from codeine in having one equivalent less of water) is soluble in water, uncrystallizable and precipitable by excess of acid. [$C_{18}H_{19}NO_2$, a product of the action of chloride of zinc on codeine. It is amorphous and has emetic properties. "Sydenham Society's Lexicon."—*Trans.*]

Hydrochlorate of apocodeine,	3 grains
Distilled water, . . .	up to 224 minims.

Sixteen to twenty-four minims = $\frac{1}{5}$ to $\frac{1}{3}$ of a grain. The emetic effect is produced in a few minutes and without fatigue to the patient (Dujardin-Beaumetz). The therapeutic properties of apocodeine are the same as those of apomorphine but to a less degree (Dujardin-Beaumetz). The hydrochlorate of aponarceine is an emetic, but is not in use.

APOMORPHINÆ HYDROCHLORAS.

Apomorphine Hydrochlorate.

Apomorphine only differs from morphine in having one equivalent less of water. The hydrochlorate is alone used.

Principal Physiological Effects.—Feeling of weight at the epigastrium; slight headache, acceleration of pulse and respiration, salivation, perspiration, nausea and vomiting. A feeling of comfort rapidly ensues followed by sleep. "Its action is direct on the nerve centre which excites vomiting, and

not, as some allege, reflex, while its elimination is effected through the gastric glands." (David.) Section of the vagi in aminals does not in any way modify the action of apomorphine (Vulpian, Harnack, Riegel, David); paralysis of these nerves, induced by atropine, appears on the other hand to diminish its action (David). A condition of almost complete and prolonged asphyxia has no influence on the activity of apomorphine (David). The hydrochlorate has no effect on the secretion of bile in dogs (David). In some animals it exercises an excitant effect which is peculiar to them. This action is centric. The animals which are thus affected do not possess the power to vomit (hare, guinea-pig, rat), or offer a peculiar resistance to the vomitive effect of apomorphine (Harnack, David). In poisonous doses it produces coma, paralysis, loss of the reflexes, etc. (Kohler, Quel).

Local Effects.—Hypodermic injections of hydrochlorate of apomorphine have never caused any local disturbance; at the most there have only been observed occasionally small subcutaneous indurations which rapidly disappeared. The pain is nil or almost nil.

Doses (*hypodermic only*).—The emetic doses used hypodermically by various authors are $\frac{1}{16}$ of a grain (Sée), $\frac{1}{18}$ of a grain for an adult, $\frac{1}{43}$ of a grain for a child (Pierce); $\frac{1}{11}$ to $\frac{1}{9}$ of a grain (Siebert, Boehm); $\frac{1}{14}$ to $\frac{1}{7}$ of a grain (Harnack); $\frac{1}{8}$ of a grain (Loeb); $\frac{1}{6}$ of a grain for an adult, $\frac{1}{8}$ for a woman and $\frac{1}{12}$ for a child (Bourgeois); $\frac{1}{7}$ of a grain (Routy); $\frac{1}{16}$ of a grain (Prévost, David); $\frac{1}{4}$ of a grain (Carville, Bourneville). [In one case a fifteenth of a grain caused great prostration. *See* New Sydenham Society's Lexicon, *Art.* Apomorphia.—*Trans.*]

Hydrochlorate of apomorphine should only be used with the utmost caution in consequence of the peculiar tendency to syncope and collapse which it induces in some subjects (David). The majority of works on therapeutics, and the formulæ of many authors, give as the emetic dose $\frac{1}{4}$ of a grain and even more (Dujardin-Beaumetz, "Clinical Therapeutics," of to $\frac{1}{3}$). This dose is decidedly dangerous; no emetic has given rise, regard being had to the frequency of its use, to so many cases of collapse and syncope (cases of Riegel and Boehm, Dujardin-Beaumetz, etc.). A dose of $\frac{1}{18}$ of a grain is sufficient for an adult when the preparation is of good quality, and even with

this dose Messrs. Prévost and David have observed an instance of alarming collapse in a woman. Loeb has seen collapse after a dose of $\frac{1}{35}$ of a grain in a child.

As the emetic doses vary according to the nature of the apomorphine employed, it seems advisable, as has been suggested by M. Prévost, to test its physiological action before administering it to the human subject.

Mode of Use and Formulæ.—According to many authors, apomorphine in solution is very unstable; it has therefore been recommended to be dissolved when required for use. Our friend, M. David, in his interesting work,[17] undertaken in conjunction with M. Prévost, of Geneva, from which we have borrowed largely, speaks as follows of hydrochlorate of apomorphine obtained from M. Duvernoy: "It dissolves with difficulty in cold, rapidly in lukewarm water. The solution after the lapse of a few minutes assumes a green tint. This color deepens, but without any impairment of the physiological effects of the solution. Our solutions after a year's use showed no signs of alteration, although we had not adopted any particular precautions. The change of color is alone noticeable. Our oldest solution is of a dirty emerald green, bordering on yellow; it is neutral in reaction and its physiological properties have not altered from the first day down to the present time. The solution which we use is $\frac{1}{35}$ of a grain of hydrochlorate of apomorphine in 16 minims of water."

The strength of solution recommended by different authors varies greatly, but a one-per-cent solution is most generally used, thus:

Hydrochlorate of apomorphine, .	1 part
Distilled water, ...	100 parts.

[Martindale and Westcott give the following formula:

Hydrochlorate of apomorphine, .	2 grains
Camphor water, ...	100 minims.

Dose—2 to 8 minims.—*Trans.*]

Bourgeois made use of dilute alcohol and distilled water as a solvent. Some add occasionally a few drops of hydrochloric acid to clear up concentrated solutions. M. C. Paul uses glycerin as a solvent. A few drops of acetic acid are sometimes added to preserve the solution, as in the following formula:

Hydrochlorate of apomorphine, .	2 grains
Distilled water, ...	220 minims
Acetic acid, ...	3 minims.
	(Kolner, 1882.)

Therapeutic Uses.—Hydrochlorate of apomorphine is prescribed chiefly as an emetic and expectorant (Juraz). Messrs. Riegel and Boehm have strongly recommded its use in children (!). Eichberg (according to Eulenburg) used it with success in an infant $2\frac{1}{2}$ years old suffering from convulsions connected with gastric disturbance; 8 minims of solution ($\frac{2}{3}$ of a grain in 100 minims) in distilled water; gastric diseases and obstruction (Worms, Vulpian, Bourneville); various forms of poisoning (morphine, chloral, and chloroform excepted); David says: as morphine delays the development of the action of apomorphine, and as chloroform and chloral injected intravenously delay the action until awakening occurs, it would be useless—nay more, dangerous—to administer hydrochlorate of apomorphine in poisoning by morphine, chloral, and chloroform, owing to the time which would be lost, if the poisoning were sufficient to produce anæsthesia and muscular relaxation. In threatened asphyxia, croup (Chouppe) pneumonia, tonsillitis, and broncho-pneumonia (Dujardin-Beaumetz, Jürgensen), laryngitis stridula, foreign bodies in œsophagus (Verger); severe hæmoptysis (Zuber, C. Paul), mania (Marthe), hystero-epilepsy (Challand, Laurencin, Gowers, Sabatowsky), emphysema with bronchitis (Vulpian, Rowty, Worms), angina tonsillaris (Zuber, Vulpian, Rowty), croup and diphtheria (Alvis, Monti), influenza (Bourneville), epilepsy (Riegel, Vallender, who quotes three cases of epilepsy with aura in which subcutaneous injections of apomorphine brought about cessation of the fits).

AQUA DESTILLATA. AQUA.

Distilled and Natural Water.

Distilled water is the vehicle in most general use for the preparation of hypodermic solutions, and it is besides the best in all cases when its use is admissible. It has also been administered hypodermically by itself. Its use was proposed in the treatment of cholera by Cantani in 1865, Michaël in 1879, and M. Beigel, who injected it in considerable quantities in this dis-

ease in 1866. In the last epidemic of cholera at Yport in 1884, M. A. Bottard made use, with varying results, of the following solution:

The white of one egg,	
Carbonate of sodium, . . .	7½ grains
Filtered sea-water, . . .	1600 minims.

Messrs. Bottard, Vallian, and Caron used 5 canulæ at once, injecting 3 or 4 syringefuls of the solution at the same place. The operation was repeated several times daily.

Cantani's formula:

Chloride of sodium, . . .	4 grains
Carbonate of sodium, . . .	3 grains
Distilled water at 95°–98° F., .	1000 minims.

Samuel's formula:

Chloride of sodium, . . .	6 grains
Carbonate of sodium, . . .	1 grain
Tepid water, ...	1000 minims.

A little morphine, opium, or camphorated oil may be added according to necessity (stage of asphyxia or of collapse).

M. Potani in 1869 used it as a substitute for morphine in localized painful affections, neuralgia, hepatic colic, etc. Drs. Pye-Smith, Burney Yeo, and Griffith had previously used subcutaneous injections of water, and Messrs. Aronssohn and A. Denis, in 1868, of tepid water. Since then numerous authors, Messrs. Dieulafoy, Luton, and Laffitte, have often injected it with success.

The water is injected in doses of 16 to 32 minims at once; it causes somewhat sharp pain, but never gives rise to bad after-effects, especially if distilled water has been used.

In pulmonary and laryngeal tuberculosis, bronchitis and pleurisy, M. Landouzy injected subcutaneously a syringeful of distilled water to which he had added a few drops of cherry-laurel water; the injections were more successful the nearer they were made to the regions where patients complained of experiencing painful sensations—such as burning, pricking, and tingling pains. The peri-laryngeal, cervical, subclavicular, intercostal spaces, and parts which were either painful or tender on pressure, were thus injected. As a general rule, paroxysms of cough in phthisical patients were in this way rap-

idly relieved, and the interval between the paroxysms was prolonged.

Is the effect of hypodermic injections of water in relieving pain to be explained by the hypothesis of M. Vulpian,[18] which certainly has the merit of probability, and was suggested to his mind by the efficacy of certain cutaneous irritants in tabetic pains, the hypothesis, namely, of a centrifugal action on the nerve-centres? Possibly this may be the explanation; but, in any case, M. Luton is of opinion that the subcutaneous injection of water produces a minimum of parenchymatous revulsive action (un minimum de révulsion parenchymateuse [The meaning of which phrase cannot be better explained or expressed than by a quotation from Bescherelle and Pons ("Nouveau dictionnaire classique de la langue Française," Paris, 1865) "Revulsion-Action: de détourner la cause d'une maladie vers un autre point."—*Trans.*]); he has obtained successful results from it in certain localized and recent pains, especially in muscular rheumatism, but in old standing and obstinate cases this treatment has been a failure. "This method," he says, "is obviously inferior to treatment by saline water and alcohol, and, above all, by nitrate of silver solution. Its effects, moreover, are of shorter duration."

Dr. Pollak has quoted a case of sciatica which was cured by the hypodermic injection of iced water.[19] M. R. Tripier has used with success hypodermic injections of fresh spring water in phthisical and other forms of vomiting; the injections were made into the epigastric region either before or immediately after food ("Lyon médical," 1881). M. Laffitte attributes the cessation of pain to the compression of the terminal nerve cellules which is caused by the injected fluid. Dr. Edward Warren[20] recommends hypodermic injections of iced water in cases of persistent hyperpyrexia; he found that these injections had an influence on other symptoms besides the temperature. He administered 480 minims by means of multiple injections into various parts of the body, one-half being injected in the morning, the rest in the evening.

M. A. Riva concludes from his experiments on dogs that the peritoneum is very tolerant of injections of water. M. Calvet observed marked diminution in the proportions of albumen after hypodermic injections of sea-water, and by the same method he obtained improvement in troublesome glan-

dular affections occurring in scrofulous children. Sea-water, when filtered, caused no pain, and suppuration but rarely. [My friend, Dr. Fergus, of Glasgow, drew my attention some years ago to the fact that in many cases acute pain can speedily be relieved by the injection of hot water. The syringe should first be warmed thoroughly, and the temperature of the water should be raised to as high a degree as can be borne without causing actual pain. In one case of colic this method afforded relief from the pain very speedily, but in cases where it was used for the relief of tabetic pains the effect was at the most equivocal.

Water has long been used hypodermically as a substitute for morphine. A list of papers bearing on this subject may be found in Neale's "Digest and Appendix," § 229.4.

Dr. Cameron Macdowall, of the Indian Medical Service, recommends intraperitoneal, in preference to subcutaneous, injections of warm water in cholera ("Lancet," vol. ii., 1883, 658). Dr. Tibaldi published the results of experiments made by him on dogs to test the value of the various plans suggested for the dilution of the blood in cases of cholera. These results, published in the "Gaz. Med. Ital. Lomb.," Nov., 1884, are quoted in the "London Medical Record," vol. xii., p. 511. Dr. Tibaldi places the highest value on intravenous injections, their effects being produced most rapidly and being most enduring. It was found that absorption from the peritoneum was slow, and even after a lapse of thirty hours fluid remained. This method, however, allows of the injection of a large quantity of water, and in this respect is preferable to subcutaneous injections. On the other hand, the hypodermic method is perfectly safe and readily effected. Arguing from analogy, Dr. Tibaldi considers all these plans perfectly safe. These injections are indicated on the appearance of the algid stage. When the symptoms of this stage are slight and there are no grave asphyxic symptoms the hypodermic method is indicated, and the injections should be made into the upper and inner surface of the thigh, the leg near the popliteal space, or the upper third of the arm. When the asphyxic symptoms are urgent, intravenous injection should be practised, the internal saphenous and veins of the forearm being chosen. When for any reason, such as extreme urgency or the difficulty of finding a sufficiently large superficial vein, the intravenous method

is contraindicated, intraperitoneal injection should be practised.—*Trans.*]

AQUA LAURO-CERASI.

Cherry-Laurel Water.

(*See Acidum Hydrocyanicum.*)

AQUÆ DESTILLATÆ AROMATICÆ.

Distilled Aromatic Waters.

These are employed as vehicles and solvents; they do not give rise to local irritation, provided they have not undergone a process of oxidation. Gubler has recommended distilled *Eucalyptus globulus* water; M. Delioux, of Savignac, peppermint and cinnamon water and M. Patrouillard, distilled elm water.

AQUÆ MINERALES.

Mineral Waters.

Various mineral waters, such as those of Bourbonne-les-Bains, Kreuznach, Pougues, and Salins have been suggested for hypodermic transfusion, as well as the bitter water from salt marshes on account of its analogy with blood serum, but none of them, so far as we know, have been employed as yet.

ARBUTINUM.

Arbutin.

Arbutin, a glucoside extracted by Lewin, of Berlin, from *Uva Ursi*, is soluble in water.

The leaves of Uva Ursi have for a very long time been used empirically as a diuretic, chiefly in catarrhal affections of the bladder. The active principle is arbutin, which yields by decomposition in the system hydroquinone. [On boiling with dilute sulphuric acid, arbutin is resolved into hydroquinone and glucose. New Sydenham Society's Lexicon.—*Trans.*] The researches of investigators into the action of arbutin are, as yet, contradictory, and fresh experiments are required before expressing an opinion as to the value of this new product.

At any rate, arbutin has been used but seldom hypodermically. The dose is 15 grains and upward.

ARGENTI NITRAS.

Nitrate of Silver.

Injections of nitrate of silver, the use of which in surgery (tumors, etc.) is so well and universally known, especially since the investigations of M. Luton, have also been employed for internal medication. The pain which follows hypodermic injections of nitrate of silver is often very sharp, although it is of short duration. "They are irritating to the degree of almost necessarily producing an abscess at the point of puncture; nevertheless, the silver nitrate limits of itself, in a manner, its own action, by the production of a zone of coagulation which it produces round itself. There is no kind of inflammation more limited; in the centre, a slough and a sero-purulent collection which isolates and eliminates it; at the circumference a ring of induration (Luton)," often of almost cartilaginous consistence. The artificial abscess allows of the escape of serous or purulent fluid, carrying with it a slough of cellular tissue, and leaving a cicatrix. M. Luton made use of two strengths of solution—one a tenth and the other a fifth:

Crystallized nitrate of silver, .	10 grains
Distilled water, . .	up to 50 or 100 minims.

Of this he injected from 4 to 16 minims. A solution of 1 in 5 almost always determines a slough and afterward an abscess; rarely, the slough is not separated, and it remains encysted in the living tissues, like a foreign body. With a solution of 1 in 10, it is to be observed that the irritation decreases the nearer the injection is made to the trunk; thus, when made at the hip there is no certainty of an abscess resulting. M. Luton does not think that there is any advantge gained by using the weaker solutions. M. Ledentu made use of a solution of 1 in 4.

Without referring to the hypodermic use of silver nitrate for surgical purposes, we find that it has been used in this way in cases of neuralgia (Luton, Ruppaner, Bertin and Michalski), rheumatism, gout (Ruppaner), chronic arthritis, tabes dorsalis (Frommhold).

M. Jacobi has suggested the following formula for hypodermic injections of silver salts in neuroses:

Argenti chloridi, ...	½ grain
Sodii hyposulphitis, ...	3 grains
Aquæ destillatæ, . . .	up to 112 minims.

M

To be kept in a dark bottle. The dose for injection is 16 minims. This solution does not cause any local disturbance. Prof. Eulenburg has recently made use of pyrophosphate of silver, soluble in 3.85 parts of a one per cent solution of phosphoric acid, and albuminate of silver ($\frac{1}{14}$ to $\frac{1}{7}$ of a grain in 16 minims).

ARSENIUM.

Arsenic, Preparations of.

Principal Physiological Effects.—In small doses.—Sensation of heat in œsophagus and stomach, increase of appetite, increase of organic functions, diminution of urea and carbonic acid, lowering of temperature and pulse.

In Large Doses.—Feeling of constriction of the throat, thirst, epigastric pains, nausea, vomiting, colic, diarrhœa, fever and headache, insomnia.

In Poisonous Doses.—Diarrhœa, with rice-water stools, sometimes bloody; cramps and aphonia, pallor of the face; debility, irregular and rapid pulse, scarcity and suppression of urine, dyspnœa, cyanosis, unconsciousness, delirium, convulsions, death.

Slow Poisoning.—Cutaneous eruptions (eczematous, scarlatiniform, etc.); conjunctivitis, extreme anæmia, loss of hair and of nails, inflammation and ulceration of nasal and laryngeal mucous membranes; paralysis, chiefly of the extensors; dropsy, cachexia, fatty degeneration of most of the organs.

Elimination is by the bile, urine, and perspiration. Its duration is very variable. The physiological effects of arsenic are, further than this, but little known.

Local Effects.—Sensation of burning, lasting from 15 to 20 minutes (Eulenburg, Bourneville). Eulenburg and Kobner have not met with any local accidents. Sometimes painful indurations are produced, never exceeding a centimetre (0.39

inch) in diameter, accompanied occasionally by slight redness and even by abscess (Bourneville).

Fowler's solution, ...	1 part
Distilled water, ...	2 parts.

Eulenburg, who has recommended this formula, but who actually used a solution of 1 in 4, in doses of $2\frac{1}{2}$ to 5 minims, =4 to 8 minims of Fowler's solution, has obtained good results from it in various forms of tremor (paralysis agitans, etc.); Kobner, in lichen ruber, and in a case of diffuse sarcoma of the skin (child of 8 years); Lesser, in lupus (1885); Soltmann, in chorea, etc., have also used Fowler's solution and distilled water, in equal parts. One of the authors has used, without success, in the clinique of Prof. Charcot, Professor Eulenburg's solution in four women affected with paralysis agitans; the number of injections was from 16 to 25 (from 15 to 40 minims); they were made on each side of the vertebral spinous processes from the nape to the sacral region. The doses injected ranged from 4 to 10 minims of Fowler's solution.

No particular symptom was observed; occasionally the patients complained of nausea. We have used at the Bicêtre, in chronic cases of chorea, not only Eulenburg's formula, but also the following, without meeting with any local accident (induration, puffing, etc.).

Fowler's solution, ...	200 minims
Distilled water,	
Glycerin, ...	of each 100 minims.

A syringe of 20 minims corresponds to 10 minims of Fowler's solution.

Fowler's solution,	
Tincture of iron malate, .	of each 100 minims.

This tincture, used in Germany, is a solution of impure malate of iron in spirit of cinnamon (1 in 10). [It bears the officinal title: *Tinctura Ferri Pomata.*—See also "Nat. Formulary," No. 398.—R.]

Dose, from a few minims to a syringeful ("Practical Formulary of the Vienna Cliniques").

Arsenic acid has been used hypodermically by Tichomirow, in the treatment of psoriasis.

Lipp, quoted by Bartholow, has injected from $\frac{1}{4}$ to $\frac{3}{4}$ of a

grain of arsenious acid. He observed as a consequence of these injections, increase of temperature and of pulse rate, impairment of appetite, diuresis, nervous excitement, vertigo, cephalalgia, cough, conjunctival redness, etc. Despite these effects produced by a dose, in our opinion, much too large, M. Lipp does not the less recommend the use of this agent, because the duration of treatment is lessened, the dose is small, and there is an absence of digestive troubles.

In Italy, Scarenzio, Gamberini, and others employed hypodermically the strong *mineral water* of Levico, containing somewhat less than $\frac{1}{65}$ of a grain per litre (nearly 34 fluid ounces), in a dose of one to two injections of 16 minims *per diem;* they obtained excellent results in many cases of obstinate skin disease, especially in cases of eczema and impetigo.

Messrs. Billroth, Czerny, and Karewsky (1884) obtained good results from the hypodermic use of arsenious acid in the treatment of lymphoma. Radcliffe used undiluted Fowler's solution, but the local irritation produced was so great that it led him to dilute it by one-half (the irritation was then less than a half of what it had been before). M. Bogomolow has injected it in doses of four minims as an antipyretic and antiseptic in remittent fever. Bartholow recommends, without appearing to have used it, solution of arseniate of sodium, in doses of 5 to 15 minims every second day.

Arseniate of sodium (crystals),	$\frac{1}{2}$ to 1 grain
Distilled water, . . .	up to 112 minims.

(To be injected in progressive doses beginning with a quarter of a syringeful = 4 minims.) José Ramon, of Torres, and Martinez ("La Crónica Medica," Nov., 1883) used this solution in psoriasis.

Therapeutics.—Puerperal fever (Lehmann, of Copenhagen), without success; chorea (Radcliffe, 1865, 2 cases successfully; Perroud, Hammond, Lewis Smith, etc.); cholera, algid state (v. Grafe); various kinds of tremor (Eulenburg); paralysis agitans (Eulenburg, Bourneville); psoriasis (Lewin, Lipp, Tichomirow); lichen ruber (Köbner); chronic eczema (Lipp); neuralgia, epilepsy, and various nervous diseases (Radcliffe); psychoses (Tebaldi).

ASPIDOSPERMINA.

Aspidospermine.

This principle, which is slightly soluble in water, insoluble in glycerin, soluble in alcohol and ether and in essential and fixed oils, is obtained from the bark of *Aspidosperma Quebracho* (Apocynaceæ), a tree orignially found in the Argentine Republic, which is regarded in that country as a febrifuge. It was, we believe, first employed in Europe by Penzold, of Erlangen, who found it had a peculiar action in cases of dyspnœa.

According to M. Burgos, powder of white Quebracho possesses the physical and organic properties of cinchona powder; it is an antiseptic. The decoction is used as a tonic and febrifuge. The phenomena observed after its administration were decreased frequency of the pulse and respirations (Berthold, Picot, Berger, Laquer). Its continued use brought on headache, vertigo, mental hebetude, and profuse salivation (Laquer, Berger). This bark contains abundant tannin and several proximate principles, among them aspidospermine (a very feeble base), and an alkaloid, quebrachine, the latter analogous in action to curare. According to M. Closson, "paralysis of the limbs in animals which survive in poisoning by aspidospermine would be due to an action of the poison on the nervous reflex centres in the spinal cord, the excitability of which is lost before the peripheral nerves, motor and sensory, and the muscles have been attacked by the poison." But with sufficient doses of aspidospermine, the peripheral nerves are first paralyzed, then the muscles lose their sensibility to stimuli to an equal extent.

The sulphate and hydrochlorate are readily soluble, and their solutions are intensely bitter. [Aspidospermine does *not* neutralize acids. But it forms with them, nevertheless, amorphous salts, which are nearly all quite soluble in water and alcohol.—R.] The hydrochlorate has been used by Penzoldt and Maragliano. The latter exhibited quebrachine or aspidospermine in asthma, in doses of $\frac{3}{4}$ to $1\frac{1}{2}$ gr., both hypodermically and by internal administration.

Sulphate of aspidospermine, . .	5 grains
Distilled water, . . .	up to 112 minims.

Aspidospermine in subcutaneous injections is recommended

by Eulenburg in the "Medicinal-Kalender und Recept-Taschenbuch für die Aerzte des deutschen Reiches," 1883.

Messrs. Huchard and Eloy[21] have made a considerable number of experiments with the principles discovered in quebracho bark by M. Hesse (aspidospermine, aspidospermatine, aspidosamine, quebrachine, hypoquebrachine), quebrachamine excepted, the existence of which is doubtful. These experiments have chiefly had reference to the influence of the alkaloids on the temperature; their antipyretic action is well marked, but uncertain in different cases. They can be classed as antipyretics in the following order:—lactate of aspidospermatine, hydrochlorate of aspidospermine, sulphate of hypoquebrachine [?], lactate of quebrachine. Most of these alkaloids caused arrest of blood changes.

These observers exhibited hydrochlorate of aspidospermine hypodermically in doses of $1\frac{1}{2}$ to 3 grains. In typhoid fever they obtained a reduction of temperature when quinine had failed. In the hectic stage of phthisis the results were as uncertain as with sulphate of quinine.

Aspidospermine, ...	6 grains
Sulphuric acid, ...	a sufficiency
Distilled water, . . .	up to 112 minims.

Sixteen minims = $\frac{6}{7}$ of a grain of the drug and upward.

Therapeutic Uses.—Aspidospermine and its salts appear to be especially useful in dyspnœa, no matter what its cause may be (Penzoldt, Berthold, Picot, Skoda, Krauth, etc.).

[The statement that quebracho and its preparations may be used in all forms of dyspnœa, must be accepted with caution. It has been used with success in dyspnœa depending on various forms of cardiac disease, *e.g.*, hypertrophy, aortic incompetence, etc. (see "Medical Record," xii., 71). From the experiments of Harnack and Hoffmann, quoted by Dr. Junker in the "Medical Record," xiii., p. 184, it appears that "the greatest therapeutic value of quebracho bark consists in its property of reducing the irritability of the respiratory centre. It will prove beneficial in cases of dyspnœa not depending on impeded aëration, *i.e.*, on insufficient oxidation of the blood in the lungs, and not being a mere compensatory symptom; namely, in dyspnœa in consequence of disorders of circulation and of diseases of the heart. In other cases, in which the dyspnœa con-

stitutes a purely compensatory manifestation, any attempt at lessening the irritability of the respiratory centres may, under certain circumstances, be fraught with danger, although this remedy may even then occasionally assist in relieving this distressing symptom. Aspidosamine is an emetic, is more energetic than apomorphine, but does not act in the same way on the brain respiratory centres.—*Trans.*]

ATROPINA.

Atropine. Sulphate and Valerianate of Atropine. Extract and Tincture of Belladonna.

Principal Physiological Effects.—In small doses, dryness of the mouth and throat, dilatation of the pupils; in larger doses difficulty of speech and deglutition, facial anæsthesia, blindness, cephalalgia, vertigo, delirium (merry or sad), hallucinations, nausea, slowing, then acceleration, of pulse, scarlatiniform redness of the skin, œdema; in poisonous doses, we find besides, aphonia, muscular spasms, collapse, coldness of the surface, and finally death with arrest of the heart in diastole. Symptoms of poisoning appear in a few minutes (2 to 10). Elimination is effected rapidly by the kidneys, especially in the herbivora.

Local Effects.—No accident is likely to occur provided the solution used is perfectly pure, contains neither acid nor alcohol, and is freshly prepared.

Sulphate of atropine, . . .	1 grain
Distilled water, . . .	up to 1120 minims.

Sixteen minims of this solution contain $\frac{1}{70}$ of a grain of atropine sulphate. It is wise to begin with a small dose, say $\frac{1}{140}$ and rarely to exceed $\frac{1}{35}$ of a grain. In the following formulæ, morphine combined with sulphate of atropine, permits us to obtain all the good effects of these two drugs, especially in the treatment of pain and insomnia, and to increase the dose with safety. The following formula is that of Dujardin-Beaumetz:

Hydrochlorate of morphine, . .	1 grain
Sulphate of atropine, . . .	$\frac{1}{140}$ grain
Cherry-laurel water, . .	up to 224 minims.

Sixteen minims of this solution contain $\frac{1}{14}$ of a grain of

morphine, and $\frac{1}{140}$ of a grain of atropine. M. N. Guéneau de Mussy makes use of the following solution:

Hydrochlorate of morphine, . .	5 grains
Sulphate of atropine, . . .	$\frac{1}{140}$ grain
Distilled water, . . .	up to 112 minims.

Sixteen minims contain $\frac{1}{70}$ of a grain of sulphate of atropine, and $\frac{1}{3}$ of a grain of the morphine salt. It is wise to begin with two to four minims. The combination of morphine with atropine has long been extolled by various authors, including Brown-Séquard (1860), Gross, Harley, Lazzati, Fränkel, Lubanski, Fourcault, Ollivier, Prévost, etc. Atropine in combination with morphine has, moreover, been praised and used with good results by Messrs. Aubert, Gayet, and L. Tripier before the days of surgical anæsthesia. Its use previous to anæsthetizing obviates the danger of syncope and secondary inconveniences, such as vomiting. [Dr. Crombie ("Practitioner," Dec., 1881) recommends the subcutaneous injection of morphine after beginning the chloroformization. See also a note on this subject by the translator ("Lancet," vol. i., 1882, p. 1031). It is imperatively necessary to examine the urine before adopting this method, because if it is resorted to in *Bright's disease* two dangers may be encountered, viz., an increased risk of chloroform asphyxia and of uræmia.—*Trans.*] The formula should be such as that of Dujardin-Beaumetz, but the doses of atropine and morphine are to be doubled. Sixteen to twenty-four minims of this solution should be injected 20 to 25 minutes before administering the chloroform.

Some authors (Scholz, Sœmann, Timermans, etc.), make use of valerianate of atropine hypodermically; Tichborne (1879) recommended salicylate of atropine. Extract and tincture of belladonna have also been administered hypodermically, but abscess has been met with after their use.

Therapeutic Uses.—The salts of atropine are chiefly indicated in neuralgia, asthma [but not in asthma when there is dryness of the tongue and mucous membranes generally, with absence of bronchial secretion. If employed in such cases it might give rise to most alarming symptoms (see "Dobell on Asthma," 1886, and "Brunton's Pharmacology," p. 215.—*Trans.*], nocturnal incontinence of urine, constipation, chorea, poisoning by fungi, intestinal obstruction, vaginismus, tetanus,

epilepsy, phthisical sweats, vomiting (of pregnancy, hysteria, etc.); but atropine is of marked service as an anti-sudorific, as antisialagogue, and for the relief of pain. Atropine has besides been used hypodermically as a hæmostatic, M. Tacke attributing to it a much more certain action than to ergot of rye.

Antagonisms.—The experiments of M. J. L. Prévost have shown a mutual antagonism between atropine and muscarine, but he thinks the antagonism between these two substances has not been conclusively proved. An antagonism between calabar bean, physostigmine (Bourneville, Frazer), and pilocarpine (Langley, Luchsinger, Straus), on the one part, and atropine on the other is generally admitted. As for the antagonism between morphine and atropine, it has not yet been adequately proved.

[See an important paper by Dr. Talfourd Jones in the "Brit. Med. Jour.," 1885, vol. ii., p. 581, on hypodermic medication. The preparation of morphine which he recommends for hypodermic use possesses many advantages. It is readily prepared, inexpensive, and keeps well. The mode of preparation is as follows: half fill an ounce stoppered bottle with ordinary water; put into the bottle 40 grains of acetate of morphine, and drop into it 4 minims of B. [or U. S.] P. acetic acid. Then fill the bottle with water, and a clear, pale solution will be obtained of the same strength as the officinal [B.P.] preparation. The same authority recommends an atropo-morphine solution, made by the addition of two grains of atropine sulphate to the ounce of morphine solution. Twelve minims = 1 grain of morphine, and $\frac{1}{20}$ of a grain of atropine. Dr. Talfourd Jones came to the following conclusions as to the use of atropo-morphine: "(1) Fairly small and moderate doses of atropine slightly increase the hypnotic properties of morphine. (2) Atropine in medicinal doses increases the anodyne properties of morphine and this increased anodynia is more marked in local than in distant injections. (3) Atropine in moderate doses counteracts the depressive action of morphine on the heart, and lessens the tendency to sickness, giddiness and faintness; and, by its influence on the circulation and on the skin, it also tends to prevent the clammy sweat, the pallor, and the coldness that morphine not infrequently induces. (4) In small doses it does not influence, to any appreciable degree, the action of morphine on the respiration; but when given in fair medicinal

doses, and *à fortiori*, in larger doses, it increases the number of respirations per minute, and augments their depth."—*Trans.*]

AURI CHLORIDUM.

Chloride of Gold.

We borrow from the work of M. S. Badia the following formula:

Chloride of gold, ...	1 grain
Distilled water, ...	560 minims.
	(*Letamendi.*)

Dose, 16 minims (= $\frac{1}{35}$ of a grain). This solution has been recommended in the treatment of certain syphilitic symptoms. Chloride of gold has also been used successfully by M. Moricourt in hysterical anæsthesia in a solution of 1 part in 500 or 1 in 1000. See also under *Hydrargyrum.*

BELLADONNA.

(*See Atropina.*)

BROMUM.

Bromine.

Soluble in 30 parts of water, also in alcohol, ether, carbon bisulphide, chloroform, glycerin. Bromine has scarcely been used hypodermically except by Goldsmith (1863) in cases of hospital gangrene, who injected one-drop doses in the immediate neighborhood of the wound. After 48 hours the wound had lost its characteristic appearance. Fronmüller has used tannin and iodide of potassium by hypodermic injection in these cases.

CAFFEINA.

Caffeine and its Salts.

Caffeine is soluble in 80 parts of water, and in 50 parts of alcohol.

The salts of caffeine are very unstable. Caffeine in combination with certain sodium salts is readily soluble; these double salts are soluble in 2 parts of boiling water, and remain in solution after cooling.

Principal Physiological Effects.— In small doses (1½ *grains*)*:* increase of functional activity of the brain without any kind of trouble; increase of force of circulation and of vascular tension. *In doses of* 6 *to* 16 *grains,* by subcutaneous injection, in a healthy man: moderate slowing of cardiac contractions, increased fulness and tension of the pulse (Riegel, 1884). *In large doses:* increase or diminution of pulse rate, lowering of blood pressure, elevation of temperature (Binz), headache, tremor of the hands, nausea, vomiting, drowsiness, tinnitus aurium, muscæ volitantes, priapism, frequent desire to micturate, hallucinations, vertigo, acceleration then diminution of the respirations. Increase of reflex excitability. *Poisonous doses* in animals induce general paralysis, arrest of the heart in diastole, death. Disappearance of grave toxic phenomena, when it takes place, does so rapidly.

Elimination takes place by the urine without modification, and by the bile (Strauch). The sulphate, hydrochlorate and hydrobromate split up into the base and acid when brought in contact with water; the citrate is merely a mixture of caffeine and citric acid [the citrate of the Brit. Pharm. containing equal parts, by weight, of each constituent.—R.], though Lloyd, in 1881 obtained a definite combination of these two substances.

Local Effects.—The solution of Pletzer causes sharp pain. Most of the solutions produce a sense of burning due to the addition of acid or alcohol.

Caffeine, ...	1½ grains
Alcohol, ...	6 minims
Distilled water, . . .	up to 96 minims.
Caffeine, ...	18 grains
Acetic acid (strong), . . .	40 minims
Distilled water, . . .	up to 864 minims.

(*Pletzer.*)

Pure caffeine (citrate or hydro-bromate of caffeine), . . .	1 grain
Alcohol, ...	up to 56 minims
or Distilled water, . . .	up to 112 minims.

For stronger solutions it is necessary to add a sufficiency of sulphuric or hydrochloric acid; sixteen to forty-eight minims of the *aqueous* solution are equivalent to ¼ to ¾ grain of caffeine (Eulenburg).

Pure caffeine,	1 grain
Distilled water,	20 minims
Alcohol,	up to 40 minims.

(*Eulenburg.*)

Citrate of caffeine,	1 grain
Glycerin,	up to 32 minims.

(*Lorent.*)

Citrate of caffeine,	1 grain
Glycerin,	32 minims
Distilled water,	up to 64 minims.

(*Erlenmeyer.*)

Caffeine,	6 grains
Salicylate of sodium,	4½ grains
Distilled water,	up to 16 minims.

Dissolve with the aid of heat. Sixteen minims contain 6 grains of caffeine.

(*Tanret* and *Dujardin-Beaumetz.*)

This last formula as well as the following will not cause any local accident or pain. It has been used with benefit by Messrs. Huchard and Lermoyez in the treatment of cholera in doses of 3 grains to 4½ grains of caffeine every two hours.

Caffeine,	50 grains
Benzoate of sodium,	59 grains
Distilled water,	up to 224 minims.

Sixteen minims contain 3½ grains of caffeine.

Caffeine,	25 grains
Cinnamate of sodium,	20 grains
Distilled water,	up to 112 minims.

Sixteen minims contain 3½ grains of caffeine.

[Injectio Caffeinæ Hypodermica.

Caffeine,	20 grains
Salicylate of sodium,	17½ grains
Distilled water	to 1 drachm.

Dose.—1 to 6 minims; contains 1 grain in 3 minims. Particularly recommended for alcoholic and morphine intoxication, also for hemicrania (Martindale and Wescott).—*Trans.*]

Garrison injected a strong infusion of coffee in a case of

morphine poisoning. M. Pallen has injected with success liquid extract of coffee in two cases of acute morphinism.

Therapeutic Uses.—Neuralgia (Eulenburg, Anstie, Pletzer); migraine (Lorent, Eulenburg); insomnia in chronic alcoholism without delirium tremens (Anstie); melancholia, hysteria, cholera (Oser); strangulated hernia (Guzman); heart disease (indications for use same as for digitalis; Riegel). It is well to begin with small doses and, if necessary, to increase them rapidly. Its greatest effect is obtained by small doses frequently repeated. It acts more rapidly than digitalis without producing cumulative effects (Riegel).

Caffeine and its salts have been strongly commended as diuretics; daily doses of 7 to 12 grains of the citrate and hydrobromate induced such abundant diuresis that general œdema disappeared in a few days (Gubler). The older formulæ presented this inconvenience that it was necessary to make many injections to attain these doses. Its constant use not inducing cumulative effects permits of its being administered for whole months (Gubler). According to Riegel, who used it in 8 cases of pleurisy and 4 of nephritis, caffeine appeared to be inferior in its action to other diuretics.

Messrs. Nothnagel and Rossbach find that a dose of 4½ grains of caffeine produces no appreciable effect in man. M. Zuelzer condemns the use of caffeine as an excitant, on account of its insufficiency in small, and the cardiac irregularities caused by large, doses.

[Caffeine has been recommended in the treatment of asthma by Thorowgood. (See Neale's "Digest," 399, 5, and the "Lancet," 1879, vol. i., p. 220. Its action on the temperature is the reverse of that of quinine. "Medical Times and Gazette," 1878, vol. ii., p. 604.—*Trans.*]

CALABARINA.

Calabarine.

(*See under Physostigmina.*)

CAMPHORA.

Camphor.

Soluble in alcohol, ether, the volatile and fixed oils, and in acetic acid. It is a feeble antiseptic. [Koch's experiments

show that in its action on the development and growth of anthrax bacilli camphor is nearly of the same power as carbolic acid; it hinders in the proportion of 1 to 2500, and prevents their development in the proportion of 1 to 1500. "Brunton's Pharmacol.," p. 77.—*Trans.*]

Principal Physiological Effects.—Slowing and reduction in force of the pulse (Pirogoff), increase in blood pressure in mammalia; reduction of temperature, increase and then decrease of respirations. Cephalalgia, incoherence in talk, hallucinations, generally of a pleasant character (Purkinje), or, from the first, lassitude, mental prostration, yawning, insensibility and loss of consciousness (Alexander, Malewski), convulsions, paralysis of nerves of sensation, of the bladder and rectum, coma and death.

If the dose has been large without being lethal, *e.g.*, from 30 to 80 grains, there is only the stage of exaltation.

Local Effects.—Sharp pain without consecutive local accidents.

Camphor, ...	5 grains
Ether, ...	40 minims
Distilled water, . . .	up to 80 minims.
	(*Eulenburg.*)
Camphor, ...	5 grains
Oil of sweet almonds, . .	up to 112 minims.

(Dupuy, Binz, Zeulzer, and "Pharmacopœia of Vienna Clinique.")

Luton has used the camphorated brandy of the Codex. Eulenburg praises camphorated brandy in doses of 16 to 32 minims, equivalent to 1½ to 3 grains of camphor, and Jürgensen recommends camphorated oil in acute anæmia.

Therapeutic Uses.—Like the preparations of ammonia, camphor is chiefly indicated in adynamia with extreme prostration.

CAMPHORA MONOBROMATA.

Monobromated Camphor.

Sparingly soluble in water, soluble in alcohol, carbon bisulphide, fixed and volatile oils. [Medical writers sometimes call this substance "bromide of camphor," "monobromide of cam-

phor." But these terms denote an entirely different chemical compound, and cannot therefore be used as synonyms of "monobromated camphor."—R.]

Principal Physiological Effects.—Diminution in number of heart beats and of respiratory movements; lowering of temperature, drowsiness. Linhart, Berger, and others deny, wrongly as we think, that monobromated camphor has any hypnotic action. M. Linhart regards it as an excitant of the nervous system. Clonic convulsions and tremors of the limbs (attributed by Lawson to lowering of the animal temperature). The prolonged use of monobromated camphor produces emaciation and abolition of the pharyngeal reflexes (Petrovitz); it does not appear that habituation to this drug can be established. Elimination is by the kidneys (Pathault, Rabuteau).

Local effects are almost nil.

Monobromated camphor, . .	3 grains
Alcohol, ...	26 minims
Glycerin, ...	up to 48 minims.

(*Bourneville.*)

The large proportion of alcohol and the viscosity of this solution have led to its condemnation by several authors. By combining monobromated camphor with other vehicles, or, perhaps, even by other proportions of the above, it may be possible to obtain a solution free from this objection.

Doses—1¾ to 4½ grains according to Hammond; from 7¾ to 36 and 62 grains.

[This dose is much too large. Bartholow recommends it in 5-grain doses for whooping cough in children. No English authority, so far as I know, states the dose at more than 10 grains.—*Trans.*]

M. Valenti y Vivo, arguing from some experiments made on dogs, alleges that there is an antagonism between strychnine and monobromated camphor.

Hypodermic injections of this substance have only been employed by one of the authors, and that very exceptionally. The necessity of multiplying punctures to attain to a sufficient dose, the insolubility of monobromated camphor in water, and the nature of the vehicles which can effect solution will always be objections to its general use.

CANNABIS INDICÆ TINCTURA.

Tincture of Indian Hemp.

Principal Physiological Effects.—Sense of warmth, tingling and pricking, weight of head, tinnitus aurium, oppression, uneasiness, constriction of the throat, dryness of the mouth, nausea, vomiting, diarrhœa. These symptoms are not always observed. [M. Villard has neither observed constipation nor diarrhœa; we have, however, observed this latter symptom, simultaneously with vomiting, in one of our friends.]

In Larger Doses.—Indian hemp is a powerful nervous excitant, there is very great activity of the intellectual faculties, mirthful and sometimes furious delirium, sense of physical and moral well-being, and of lightness, illusions and hallucinations, chiefly visual, increased acuteness of hearing, the movements of locomotion are spasmodic or incoördinated, sleep sometimes disturbed by nightmares.

In Poisonous Doses.—Stupor, coma allied to that of narcotism, anæsthesia and analgesia; rarely there is a manifestation of cataleptic phenomena, lassitude, cephalalgia. The opinions of authors are contradictory as to the effect of cannabis indica on the circulation and temperature. The bronchial, urinary, and sweat secretions are increased, the salivary is diminished. Indian hemp is an aphrodisiac in small, and an anaphrodisiac in large doses; it causes uterine contractions.

Chronic Poisoning.—Physical and mental enfeeblement, listlessness and melancholia, very marked emaciation, stiffness and sometimes tremblings of the limbs, slowness of movements.[22]

Hunter was the first to use injections of Indian hemp; according to Tamhayn he also used it subcutaneously in several cases of tetanus. In one case of chronic miliary tuberculosis, where the prolonged use of morphine had been productive of no result, Prof. Eulenburg obtained by injections of tincture of cannabis, calmer sleep, and a perceptible diminution of cough and pain. He made use of a solution of equal parts of the tincture and distilled water in doses of 10 to 15 drops. From this dose no unpleasant symptoms were observed. Cannabis indica is scarcely ever used now as a hypnotic; but M. Frommüller uses the tannate of cannabin for this purpose.

Tincture of cannabis indica,
Distilled water, ... equal parts.

From 2 to 5 minims. This solution readily produced abscess.

[It is to be observed that the tincture of cannabis indica made according to the French [or the U. S.] Pharmacopœia is not identical with that of the "British Pharmacopœia, the latter being made by solution of the extract in spirit, the former from the leaves. Dr. Strange, of Worcester, has obtained good results from the use of cannabis indica in the early stages of mania with delusions. Fronmüller has obtained excellent results from the use of Merck's cannabin tannate [made by a process which has not been published. The preparation consists chiefly of the glucoside cannabin, combined with tannic acid.—R.] in cases of nervous insomnia.[23]—*Trans.*]

CANTHARIDIS TINCTURA. CANTHARIDINUM.

Tincture of Cantharides. Cantharidin.

Cantharidin, the vesicating principle of cantharides, is almost insoluble in water and cold alcohol, but readily soluble in boiling alcohol and in ether, chloroform, alkalies and fixed oils.

In a moderately large dose, or slightly under one grain, cantharides powder induces intense vesical tenesmus, gives rise to a sense of tickling of the glans penis, and burning heat in the renal and vesical regions.

In very large doses (16 grains and upward), besides frequent calls to urinate, it leads to ischuria and anuria, albuminuria, painful erections (according to Schroff the action on the sexual organs is due entirely to the essential oil of cantharides), gastro-enteritis, considerable acceleration of pulse and respiration, tinglings, narcotism, dyspnœa, paralysis of the respiratory centre, and general convulsions. Cantharidin is eliminated by all the fluids of the body, but it manifests its action on the surfaces only by acidity of the secretion. It circulates in the blood current in the condition of an alkaline cantharidate, under which form it loses its irritant action (Centisson). The lethal dose of cantharides powder is about 30 grains (Orfila, Schroff); the fatal dose of cantharidin is 100

times less. Tincture of cantharides has been used by Ruppaner in doses of 25 drops (!) in a case of sciatica; the injection was made in the neighborhood of the great trochanter. It was followed by violent pain and the sciatica was relieved, but four days afterward an abscess formed which discharged naturally. In this case the remission was longer than that obtained by opiates and atropine. Luton, after a dose of 20 minims only, observed redness and slight induration.

Cantharidin, ...	1 grain
Chloroform, ...	up to 112 minims.

Dose.—One-fourteenth to one-seventh of a minim = $\frac{1}{140}$ to $\frac{1}{700}$ of a grain of cantharidin without producing local vesication. Used in the local treatment of pain (Laboulbène; account must be taken here of the action of the chloroform), and in the treatment of chronic nephritis (Laboulbène, Quinquaud).

CAYAPONINUM.

Cayaponin.

A neutral principle obtained from the *Cayaponia globulosa* (Cucurbitaceæ); a drastic purgative much used in veterinary medicine in Brazil. In a one-per-cent solution administered by the mouth, a few drops are sufficient to produce in a short time copious stools without colic. Gubler injected $\frac{1}{12}$ of a grain in one-per-cent solution, without producing purgation, in a case of lead poisoning; at the moment of injection nothing abnormal was observed, but afterward a large painful tumor formed, an œdematous thickening with large ecchymosed aureola surrounding the puncture; the skin presented a slight rose tint. From the centre of the tumor, which persisted for seventeen days, there radiated branching nodosities.

CEDRINUM.

Cedrin.

A crystallizable principle readily soluble in water, obtained by M. Tanret from the seeds of *Simaba Cedron* (Simarubaceæ), a tree growing in Columbia and Costa Rica. In its native country the cedron is in repute in intermittent fevers, serpents' bites, and rabies. It is possessed of tonic properties,

and has also been used in chronic diarrhœa, septicæmia, gout, neuralgia, intestinal worms, and also to arouse uterine contractions. In a dose of $\frac{1}{16}$ of a grain injected hypodermically cedrin produced vertigo in an adult. Its febrifuge virtues are indisputable (Restrepo). Cedrin has been injected hypodermically by M. Restrepo (Dr. Dujardin-Beaumetz's clinique) with comparative success in ague.

CHLORAL HYDRAS.

Hydrate of Chloral.

Physiological Effects.—Feeling of lassitude, irresistible drowsiness, sleep, sometimes preceded by a stage of excitement, especially in drunkards, slowing of the pulse and of respiration and pupillary contraction; preservation of sensibility and reflex excitability, which disappear, however, after large doses; lowering of the temperature. Death by arrest of respiration and sometimes of the heart in diastole. The action of chloral is not due, as has been supposed, to decomposition in the economy into chloroform and an alkaline formate. Moreover, the physiological actions of chloral and chloroform are different. The surface of a wound painted with a 15-per-cent solution becomes covered by a thin slough. In *chronic chloralism*, cutaneous eruptions, intellectual troubles, marasmus, etc., are produced.

Antagonisms.—Picrotoxin (Crichton Browne); nitrite of amyl (Trafford, Dabury, Bussat). [Electricity, atropine, and strychnine have also been recommended in the treatment of chloral poisoning.—*Trans.*]

Local Effects.—Porta, in 69 injections of chloral, has met with 29 instances of local disturbance (phlegmon, abscess, sloughs, lymphadenitis, lymphangitis). One of the authors has used chloral hypodermically in a certain number of cases; he has observed pain of short duration, and sometimes redness and thickening; moreover he has had occasion to examine the skin in two of his patients; in one he could find no lesion attributable to the chloral, in the other, at the point of puncture he found an ecchymotic patch of 8 to 12 millimetres diameter; at this point the cellular tissue was more than usually adherent. At other points, he observed, besides adhesions

of the cellular tissue, indurations in the form of a nucleus with sanguineous effusion (ecchymoses). Finally, in 3 or 4 places, besides the lesions already described, there were in the centre of the indurations small lenticular abscesses. In this case the cellular tissue was partially infiltrated. May not the lesions found at the autopsy have been due to this cause? Other punctures had left no trace.

Chloral, ...	7 grains
Water, ...	up to 16 minims.
Chloral, ...	2½ grains
Glycerin, ...	up to 16 minims.

(*Dujardin-Beaumetz.*)

Hugel has administered chloral hypodermically, as a hypnotic, in aqueous solution (equal parts, and one of chloral to two of water) without producing narcotism. The same pain was produced at the seat of injection and in the surrounding parts. Five half-per-cent injections caused ulcerations in the parts operated on. Chloral has, moreover, been given in combination with morphine (Vidal, Estachy). (See MORPHINE.)

Therapeutic Uses.—Chloral acts more rapidly and certainly as a hypnotic than morphine without producing the ill-effects of the latter. It is therefore especially indicated in the treatment of insomnia. It has been used in cholera (Higgison and Hall), tetanus (Bourneville), eclampsia (Rückard, Froger, Purefroy), neuralgia (Namias, solution 1 to 2), psychoses (Urtel, aqueous solution, equal parts of chloral and water), poisoning by strychnine (Crothers, Charteris, Faucon, in 1882, solution of 1 to 3, given in doses proportional to the quantity of strychnine absorbed).

Many authors, among others M. Gontier ("Thèse de Paris," an essay of particular interest), condemn subcutaneous injections of chloral on account of its caustic action, of the necessity of multiplying punctures, and, in short, of the local troubles which have been observed so often. M. Vulpian has, in consequence of the result of intravenous injections in dogs, indicated the possibility of producing hæmaturia. In view of its causticity, chloral has the inconvenience of necessitating the use of very dilute solutions.

[Playfair recommends chloral as the remedy *par excellence* in rigid os in the first stage of labor, "especially where rigidity

is associated with spasmodic contraction of the muscular fibres of the cervix." He recommends it more strongly than chloroform in the early stages of dilatation where there are severe inoperative pains, inasmuch as chloral has no tendency to annul uterine contractions. He gives it in 15-grain doses every 20 minutes. It might with advantage be used hypodermically in such cases, and the unpleasant local effects would be minimized, if not entirely obviated, by practising deep intramuscular injection in the gluteal region—see note on Ergotin. —*Trans.*]

CROTON-CHLORAL HYDRAS. CHLORAL BUTYLICUM.

CROTON CHLORAL HYDRATE.—BUTYL CHLORAL (HYDRATE).

Soluble in 20 parts water, more so in glycerin, also in water combined with glycerin, and in alcohol. It is not well adapted for hypodermic administration. Croton chloral is a hypnotic like chloral, from which, however, it differs physiologically and physically. It has been injected under the skin of the gluteal region by Worms in two cases.

Croton chloral, ... 4 grains
Glycerin, ... up to 16 minims.

Sharp pain resulted from the injection but no hypnotism. In one case there was marked swelling with decided redness over an area of 6 centimetres (2.34 inches). In another there was a slough of 2 centimetres diameter (0.78 inch)

Croton chloral, ... 16 grains
Warm glycerin,
Cherry-laurel water, of each,
equal parts up to 352 minims.
(*Léoni.*)

Sixteen minims represent $\frac{3}{4}$ of a grain of croton-chloral nearly. Most authors have given up injections of croton-chloral on account of its irritant action.

CHLOROFORMUM.

CHLOROFORM

First employed hypodermically by Hunter, who discontinued its use on account of the acute pain and intense inflam-

mation to which it gave rise. It was injected again, chiefly in neuralgia of the trigeminal, by Drs. Bartholow, Weir Mitchell, and Mattison. Dr. Bartholow injected from 10 to 12 minims; great pain was induced but the attacks discontinued. He practised the injections in the upper lip, compressing the point of puncture for some seconds, which prevented any local inflammation and its consequences; he did not then find more than a slight puffing along the track of the needle and a transient hardness of the tissues. After an injection of 15 minims in himself, this author experienced slight pain and local anæsthesia extending from the inguinal region to the foot; this anæsthesia persisted for nearly 3 months.

Dr. Mattison, after an injection of half a drachm of chloroform, noted a sharp pain lasting four minutes, puffiness round the puncture, and narcosis for two hours; the neuralgic attacks recurred. M. Collins injected successfully 30 to 40 minims in cases of old-standing sciatica. M. Cérenville (1876) observed in one of his patients after injections of chloroform, which were not painful (50 minims in posterior portion of middle of thigh), complete anæsthesia of the limb; in another case he observed a painful induration. At the beginning of his experiments M. Cérenville injected a syringeful without inconvenience. Afterward he used small doses with equally good results. In cases of sciatica of long standing, which had resisted every other mode of treatment, he obtained success by this method, but it must be observed that he found it necessary to make a larger number of injections than Collins.

M. Besnier (1878) has praised injections of pure chloroform in doses of 8 to 16 minims in the treatment of all local pains, no matter what their cause may be (neuralgiæ, etc.); he never observed general symptoms, and locally only a slight inflammation. According to him the pain should be easily borne or absolutely nil; the operation, when properly performed, should cause neither induration nor nodosities.

Injections of chloroform have also been recommended by Messrs. Dujardin-Beaumetz, C. Paul, Hamelin, Landouzy and Durau, who record results which are closely analogous to those obtained by M. Besnier. M. Féréol has endeavored, with negative results, to substitute injections of chloroform for injections of morphine in patients suffering from neuralgiæ, cancer, hepatic colic, lumbago, etc. The injection was not more

painful than that of pure water, and never produced any local accident (phlegmon, induration, sloughing). Dr. Dujardin-Beaumetz has stated that since he has used chloroform injections with greater frequency, the sloughs due to these injections have become less and less frequent, and that in fact they are only produced when the injection is badly performed.

M. H. Fournier (clinique of Dr. Dujardin-Beaumetz) has tried hypodermic injections of chloroform in the treatment of insomnia. A dose of one drachm was generally sufficient, but no fixed rules can be laid down, and on one occasion it was necessary to give two drachms. Sleep is not associated with anæsthesia. (Chloroform sleep is accompanied with cerebral anæmia.—Arloing.) These injections do not give rise to symptoms of general excitement, which inhalations of ether and chloroform produce. They are not followed by accidents when they are well performed.

Dr. Doe, of Boston, has used with benefit hypodermic injections of chloroform in herpes zoster. M. G. Guillot, after M. Dop, of Toulouse, has used injections of chloroform in toothache; the injections were made into the gum, and produced no local ill-results. M. Blocq has published a case where submucous injections of chloroform into the gum caused very grave results. According to M. Guillot, however, the accidents observed in this case were probably due to impurity of the chloroform employed.

CHRYSAROBINUM.

Chrysarobin (usually misnamed Chrysophanic Acid).

Extracted from Goa powder, a product of a tree found in Brazil, belonging to the family Leguminosæ. It occurs in the form of minute yellow needle-shaped crystals, and belongs to the group of the phenols. This substance, which is not an acid, but a mixture of various proximate principles, at first only used externally (Balmanno Squire, 1878, etc.), has been administered internally since 1881. It is almost insoluble in water, soluble in hot alcohol (224 parts of alcohol at (186.8° F.), benzol, vinegar, vaseline, acetic acid, and very soluble in alkalies.

Chrysarobin is the principle contained in the Goa powder from which chrysophanic acid is derived by oxidation. These

two bodies differ from one another, but either name is often used to designate the substance under discussion.

Principal Physiological Actions.—Loss of appetite, nausea, vomiting, rigors followed by heat, vertigo, sensation of burning and constriction at epigastrium, diarrhœa; intolerance of the drug in different doses varying with the subject, and according to the degree of habituation. The medium dose is about one-seventh of a grain daily for children, and about half a grain daily for adults (Stocquart).

Local Effects.—Even in very weak doses ($\frac{1}{70}$ grain and under), chrysarobin often causes suppuration, lancinating pains, and swelling.

It was first used hypodermically by Stocquart, of Brussels, and with success in eczema, lichen, prurigo, psoriasis and urticaria. Its action would be more rapid and as effectual administered externally, or internally by the stomach; moreover, the accidents resulting from the use of subcutaneous injections of this drug only permit of recourse being had to it in extreme cases, and in minute doses (to $\frac{1}{560}$ of $\frac{1}{140}$ a grain); it is important also to avoid injections into parts susceptible of injury, *e.g.*, the nape, etc.

Chrysarobin, ...	$\frac{1}{2}$ to 1 grain
Distilled water, . . .	2 oz. 160 minims.

CINCHONIDINA. (*See Quinina.*)

CINCHONINA. (*See Quinina.*)

CINNAMOMUM.

Cinnamon, Distilled Water and Tincture.

Distilled cinnamon water has been proposed as a vehicle for solutions (Delioux of Savignac). Cinnamon possesses all the properties of aromatics; it has the power of exciting uterine contractions. It is often prescribed for chronic diarrhœa. Tincture of cinnamon has been used by Luton as a local stimulant in cancer.

COCAINA.

Cocaine and its Salts.

Extracted for the first time from coca leaves by Gaedcke (1855), by Percy (1857), then by Niemann (1859), this alkaloid

occurs in the form of white colorless needles, of a faintly bitter taste and sparingly soluble in water.

The hydrochlorate of cocaine crystallizes in colorless prisms containing 9.59 per cent of water. It is also obtained in anhydrous crystals, which are to be preferred for medicinal use. It dissolves readily in water, and produces local anæsthesia.

Principal Physiological Effects.—Dilatation of the pupils, by paralysis of the filaments of the great sympathetic (Berthold), elevation of the temperature in small doses, lowering after large and poisonous doses (minimum or maximum of temperature variation one-half to one degree after injection; Nègre), increase in pulse volume, increase in respiratory movements followed by irregularity, lowering, followed quickly by increase, of blood pressure (Laborde). Vertigo after doses of $\frac{1}{4}$ to $1\frac{1}{2}$ grains (Von Anrep, 1880); experiments made on animals by the subcutaneous and intravenous methods have established the fact that, in large doses, cocaine produces hyperexcitability, epileptiform convulsions (from its action on the brain and spinal cord), general analgesia and mydriasis (Morenoy Maïz, Rondeau and Glay, Laborde, Vulpian). According to M. Berthold, there is similarity of action between cocaine and atropine. Injection into the jugular vein of an animal of about $\frac{1}{2}$ of a grain of hydrochlorate of cocaine produces considerable fall of blood-pressure without a previous rise. Elimination is by the kidneys.

Hydrochlorate of cocaine, . .	4 grains
Distilled water, . . .	up to 112 minims.

(*Croston*, 1884.)

An injection of 4 minims (= $\frac{1}{4}$ of a grain) at intervals of 3 to 5 minutes round a tumor of the face. The first injection was the only painful one. Operation for removal of the tumor was commenced after the third injection, and completed in about 10 minutes.

Since then many medical men have used solutions of cocaine hypodermically in similar cases, among others Messrs. Hall, Halsted, Ceci (5-per-cent solution, 1885), etc.

According to Dr. Dujardin-Beaumetz, there have been observed after injections of cocaine practised on persons in the erect posture, vertigo, syncope, and sensorial illusions with cerebral excitement.

Messrs. Morselli and Buccola have in the medico-psychological clinique of Turin submitted to systematic treatment (in one case for two months) patients affected with melancholia. The doses injected were from $\frac{1}{35}$ to $\frac{1}{7}$ of a grain of cocaine (pupillary dilatation, though, according to M. Livierato, of Geneva, hypodermic injections do not produce mydriasis, rise of temperature—sometimes from one to two degrees—acceleration of pulse and respiration). They found marked amelioration from this course of treatment.

Hydrochlorate of cocaine, . . 1 grain
Distilled water, . . . up to 112 minims.
16 minims = $\frac{1}{7}$ of a grain.

(*Nègre.*)

Puncture and injection were alike absolutely painless. After 2 or 3 hours there were observed pain and redness corresponding with a slight puffiness (Nègre), never with abscess or true inflammation.

In 1884 Messrs. Baratoux and Burchard availed themselves of the local action of cocaine (1 in 50, or 1 in 25 solution) to open abscesses and whitlows. Wilson removed a lipoma under the anæsthetic action of cocaine.

The experiments of M. Nègre showed that after hypodermic injections in man, made on the dorsal aspect of the forearm, anæsthesia is constant at the site of puncture, and extends in most cases over an elliptical area of which the puncture forms the upper limit. Anæsthesia lasted about ten minutes, and diminished progressively from above downward, but most notably downward.

Dr. Da Costa had formerly observed, after the hypodermic injection of a few centigrammes, and even of a few milligrammes, of cocaine, diminished sensibility at the point of injection and round about; but he thought that this diminished sensibility was of small importance. He obtained no benefit from subcutaneous injections in the treatment of neuralgia.

M. Frignani has used with benefit in the dysphagia of phthisis solutions of cocaine (9 per cent) hypodermically; 4 injections per diem.

Messrs. Hall, Nash, and Cartwright have used a submucous injection of hydrochlorate of cocaine (20 to 30 per cent solution) for tooth extraction. According to M. Brasseur, hy-

drochlorate of cocaine by submucous injection has at the best given but doubful results in cases of toothache.

Dr. Franchotte made use, on himself and another, of hypodermic injections of cocaine (2 per cent) for migraine. He experienced 5 minutes after the injection of 2 centigrammes ($\frac{2}{7}$ grain) a sense of well-being, and obtained complete relief from the hemicrania, but the migraine recurred, although in a milder form.

Hydrochlorate of cocaine has also been combined with morphine (Rusconi) and bichloride of mercury (Plevani). See also MORPHINA and HYDRARGYRUM.

[Prof. Mosler has obtained excellent results from the use of salicylate of cocaine in the treatment of asthma. He injects $\frac{1}{4}$ of a grain in 5 per cent solution.—*Trans.*]

CODEINA.

CODEINE.

Soluble in 80 parts of water, in alcohol, and in ether. For its physiological effects, see the article MORPHINA.

The hydrochlorate and the phosphate of codeine are alone used.[24]

Hydrochlorate of codeine, . . 1 grain
Distilled water, . . . up to 128 minims.
16 minims = $\frac{1}{8}$ of a grain.

(*Erlenmeyer.*)

Erlenmeyer has used it, without apparent benefit, in neuralgia; Reissner in mental diseases in doses of $\frac{3}{4}$ grain to $1\frac{3}{4}$ grains, and Piedvache has used it with success in two cases of neuralgia in solution of 1 in 20.

Phosphate of codeine is soluble in 4 parts of water, and contains 70 per cent of codeine. This salt should be administered in doses twice as large as those of morphine.

Very exceptionally, there are inflammatory troubles at the point of injection. According to M. Yvon, this salt administered hypodermically in a dose of $1\frac{1}{2}$ grains produced no therapeutic result.

[Codeine has also been used in gastrodynia, cancer, and insomnia. It is very useful in some forms of cough, and particularly so in diabetes. In one case of obstinate bronchial asthma I have found it more effectual than any other drug

in quieting the paroxysms and inducing sound refreshing sleep.—*Trans.*]

COLCHICINA.

Colchicine.

Administered first by Lorent in gout, in doses of $\frac{1}{30}$ of a grain, it produced such painful and inflammatory effects that he discontinued its use. He did not observe any effect on pulse and respiration. M. Heyfelder used it with success in articular rheumatism and various neuralgiæ, among others in sciatica.

Colchicine,	1 grain
Distilled water,	up to 1 ounce, 80 minims

Sixteen minims for one dose = $\frac{1}{30}$ of a grain.

Injection causes a sharp burning pain. In one-third of the cases there were signs of local inflammation.

Colchicine has also been employed in chronic rheumatism, in similar doses, by M. Badia, of Barcelona, and by M. Hirsch in acute articular rheumatism, five drops of a 1 in 10 solution once to thrice daily. The local phenomena were insignificant.

According to M. Laborde crystallized colchicine should be included in the category of those proximate principles which require to be administered by centigrammes and not by milligrammes. In doses of one centigramme ($\frac{1}{5}$ grain) it produces in man nausea and vomiting. [According to recent authorities, *pure* colchicine is a powerful agent, and should be used with great care. It is not unlikely that former experimenters have had an impure substance under their hands, of inferior activity.—R.]

CONDURANGO, DECOCTION OF.

The injection of decoction of condurango is said to have yielded encouraging results in four cases of gastric and œsophageal cancer. It is especially useful in gastric catarrh.

CONIINA. CONIINÆ HYDROBROMAS.

Coniine (Conicine). Hydrobromate of Coniine.

Coniine is a *liquid* alkaloid, insoluble in water, soluble in alcohol and ether.

[By a misconception dating back many years, the name *cicutine*, applied by Polex to the volatile alkaloid obtained from the root of *Cicuta virosa*, has been and is still sometimes regarded as a synonym of *coniine*. In the French and Belgian Pharmacopœias the former name is even the leading title. It should be abandoned.—R.]

Principal Physiological Effects.—These are very variable; dejection, sadness, general tremors, dyspnœa, rapid pulse, increase, then diminution and finally loss, of reflex irritability; slowing of the pulse and respirations; analgesia; paralyzing action on motor nerves, which lose their excitability. M. Tyriakan attributes this action to a species of essential empyreumatic oil, as yet ill-defined, extracted from German coniine by M. Mourrut. [This cannot be the case at present, as the coniine made by the German manufacturing chemists is remarkably pure.—R.] The vagus nerve, which is the first to suffer, is also the first to recover.

Pure coniine has no physiological action on the motor and sensory nerves; it affects motion and sensation only by its action on the nerve centres (Tuloup). Respiration is most rapidly affected, the heart is the last to die; the organs of sense, the digestive and calorific functions are little affected (Tuloup); affections of sight, collapse, and death by asphyxia. The hydrochlorate and hydrobromate of coniine are stable salts. Their action is similar to that of coniine, but more energetic. In short, it is very difficult to estimate the action of coniine and of its salts, because of their instability and irregularity of action.

According to M. Bochefontaine, Conium maculatum contains two active principles, viz., coniine (conicine, "cicutine") paralyzing the central nervous system, and another alkaloid resembling curare. Two hydrobromates are to be distinguished, one of an amber color [?—R.] comporting itself like coniine; the other of a mother-of-pearl tint, acting like curare. It was the latter which M. Prévost used.

The poisonous dose of coniine varies from $\frac{3}{4}$ of a grain to 8 grains according to the preparation used (Van Hasselt-Heukel); according to Messrs. Tuloup, Bochefontaine and Tyriakan, as much as $7\frac{1}{2}$ to 8 grains may be given in alcoholic solution to dogs without a fatal result.

The hydrobromate of coniine may be prescribed, according

to M. Tyriakan, in a small dose of 1½ grains, which may be repeated several times a day till 15 grains or more have been taken. According to M. Tuloup it is well to begin with 1½ grains of hydrobromate of coniine, to be taken twice in the 24 hours; the dose should not exceed 4 to 4½ grains. Young children have borne doses of $\frac{1}{7}$ to $\frac{2}{7}$ grain without evil effects—convulsions or diarrhœa—merely apathy and weakness of the limbs.

Elimination is rapidly effected by the skin and lungs. There is possibly a physiological antagonism between strychnine and coniine, but it has not been demonstrated.

[The dose of coniine and its hydrobromate should not exceed ½ to 2 grains. According to Brunton it is useless in tetanus and strychnine poisoning.—*Trans.*]

Local Effects.—In no case was pain or inflammation of the cellular tissue observed (Jousset); on the other hand, Messrs. Tyriakan and Tuloup assert that it is possessed of caustic and irritant properties. The hydrobromate has no local irritant action (Tyriakan).

Coniine, ...	1 grain
Alcohol, ...	90 minims
Distilled water, .	up to 1½ ounces, 48 minims.

Sixteen minims = $\frac{1}{48}$ grain.

Coniine, ...	1 grain
Diluted alcohol, ...	144 minims
Distilled water, . . .	up to 288 minims.

From 4 to 16 minims $\frac{1}{72}$ to $\frac{1}{18}$ of a grain ("Pharmacopœia of the Vienna Hospitals").

Hydrobromate of coniine, . .	1 grain
Alcohol, ...	3 minims
Cherry-laurel water, . .	up to 48 minims.

Sixteen minims of the solution contain $\frac{1}{3}$ of a grain of the salt. (*Dujardin-Beaumetz.*)

Hydrobromate of coniine, . .	1 grain
Distilled water, ...	20 minims.

Dose, 1 to 3 minims (*Martindale*).

Therapeutic Uses.—Asthma (Pletzer, D'Heilly), pulmonary emphysema and angina pectoris (Erlenmeyer, Lorent), pneumonia and pleurisy (Lorent), tetanus (Stewart), fever (Wert-

heim), blepharospasm (Eulenburg), whooping cough, bronchitis and spasmodic laryngitis (Méga), tic douloreux (Chaussier, Duméril), chorea (Welch, Harley).

Coniine and its salts have, moreover, been used by Busch as narcotics (aqueous solution of 1 in 480), and they have been praised by Messrs. Tuloup, Tyriakan, and Dujardin-Beaumetz in the treatment of convulsive cough, dyspnœa, laryngismus stridulus, various forms of spasm, tetanus, eclampsia, epilepsy, hysteria, and neuralgia.

[Sir Crichton Browne recommends coniine in acute mania. —*Trans.*]

CONVALLARIA MAJALIS.

Lily of the Valley.

Convallaria majalis, recommended by various authors as a cardiac remedy, has been used hypodermically in a few cases by Dr. Smith Andrew ("Cases Illustrating the Action of Convallaria on the Heart." "Archives of Medicine," VIII., p. 293). [I have not been able to find a reference to this essay in the English journals.—*Trans.*]

CORNUTINUM.

(*See Acidum Sclerotinicum.*)

COTOINUM.

Cotoin.

Cotoin was isolated by J. Jobst, of Stuttgart, in 1875. It is a glucoside extracted from coto bark (obtained from a tree hitherto undetermined); crystallizes in yellow quadratic needles; is fusible at 130° C. (Wurtz); is soluble in boiling water; also in alcohol, ether, benzol, and chloroform; is slightly soluble in cold water, and almost insoluble in petroleum benzin. It has a sharp, biting taste.

According to Pribram it is an antiputrescent and antizymotic, but Albertoni asserts that it only delays fermentation.

Physiological Properties.—In doses of 16 grains it had no poisonous effect on rabbits (Burkart); one and a half to three grains administered to a healthy man (the dose being repeated several times daily) increased the appetite without producing any disorder or constipation. It is insoluble in the gastric

juice, but is soluble in the intestinal fluids; dilates the abdominal vessels (Albertoni); modifies and restores the functional energy of the intestinal epithelium (Albertoni); lowers the temperature (Burkart); has no effect on peristalsis, but is possessed of antisudorific (Fronmüller) and antisialagogue properties (Albertoni). Elimination is effected by the urine; there is diminution of indican (Burkart, Pribram).

Therapeutic Uses.—Cotoin is chiefly useful in the treatment of diarrhœa, except in cases of ulceration of the intestines and in patients suffering from alcoholism and cirrhosis (Burkart, Albertoni, Gielt, Pribram, Petrone).

It has also been recommended in cholera, the night sweats of phthisis (Fronmüller), salivation (Albertoni), etc. Some observers appear to have obtained no result from the exhibition of cotoin (Patella, Cattani, Bergesio, etc.).[25]

Cotoin, ...	4 grains
Acetic ether, ...	up to 16 minims.

Inject a Pravaz syringeful (16 minims) every 15 or 20 minutes, or every hour. The injection must be made deeply.

Messrs. Burkart and Jobst, who, subsequently to Baltz (1878), recommended this solution in cholera, advised that 8 to 16 grains of chloral should be added to diminish the pain. They also say that, according to the gravity of the case, the dose may be increased, as the preparations of coto have no narcotic effect and do not give rise to any trouble.

CREASOTUM.

Creasote.

Creasote was used in 1884 by Rynd as a vehicle for morphine.

Morphine, ...	10 grains
Creasote, ...	1 drachm.

Six drops for one dose in sciatica. He obtained good results from this prescription. Eulenburg in one case of facial neuralgia injected 3 drops of the solution. The injection was extremely painful and produced an elevation of the skin resulting in a yellow pustule which subsided on the second day and was succeeded by sloughing, redness, infiltration, and thickening.

Creasote has recently been injected subcutaneously in the treatment of phthisis by Messrs. du Castel and Maigret (1882 and 1884).

Dried pepsin, ...	10 grains
Creasote (from beech-wood tar), .	3 minims
Glycerin, ...	80 minims
Alcohol, ...	10 minims
Water, ...	up to 112 minims.

The pain produced by this injection may be avoided by adding to the formula $\frac{1}{4}$ to $\frac{1}{2}$ grain of hydrochlorate of morphine. Sixteen minims of the solution contain $\frac{3}{4}$ minim of creasote. Five to six injections daily may be made deeply and, if necessary, into the muscular substance.

CUPRI SULPHAS.

Copper, Sulphate of.

Sulphate of copper has been used, without any effect, as an emetic by Lissauer. He found that the injection caused violent local inflammation and abscess. M. Luton used it to produce suppuration by derivation, but he found it inferior for this purpose to nitrate of silver.

CURARA; CURARINA.

Curare; Curarine.

Curare is soluble in water, and in alcohol and water, but is insoluble in ether. Curarine is deliquescent and readily soluble in alcohol and in water.

Principal Physiological Effects of Curare.—From $\frac{1}{4}$ to $\frac{5}{4}$ grain; congestion of brain, violent, but transient; headache, feeling of fatigue, apathy, increase of salivary, lachrymal, sudoriparous and urinary secretions, glycosuria, pulse of greater force and frequency, more rapid respiration, and increase of temperature.

In doses of $1\frac{1}{2}$ grains; rigors, frequent and feeble heart beats, increase of temperature, increase of secretions, distress, and affections of sight, paralysis of lower limbs, intense headache, no loss of consciousness or sensation, diminution of organic changes.

The paralytic action of curare is at first confined to the extremities of the motor nerves; in very large doses this effect extends to the intra-vascular extremities of the vaso-motor nerves. Death occurs from paralysis of respiration. Elimination is rapidly effected by the kidneys. The physiological effects of curare and curarine are identical, but the latter is the more powerful.

Antidotes.—Ligature above the wound by which the poison has been introduced. Artificial respiration, kept up for 2 or 3 hours.

Dose.—According to Messrs. A. Voisin and H. Liouville the hypodermic dose should begin from $\frac{1}{2}$ to $\frac{3}{4}$ grain. Curarine might in man be injected in doses beginning at $\frac{1}{7}$ grain. Poisonous doses manifest their effects in 3 or 4 minutes; if no effect is noticed after a lapse of half an hour the curare used may be regarded as inert.

The diaphragm being the last muscle the nerve endings of which are attacked by curare, it is easily understood how, when, by degrees, all the other muscles are in a state of relaxation, it may of itself keep up respiration, and consequently maintain life. The *extreme dose* is that which, though producing paralysis of the nerve endings of all the other muscles, still permits the diaphragm to act.

As the greatest uncertainty prevails as to the nature and source of the curare used, it is quite essential to test that which it is proposed to administer. We have therefore to ascertain (1) the genuineness of the curare (2) the degree of its activity. The samples of curare are never alike, the most active only cause death in a rabbit of 4 to 5 pounds in a dose of $\frac{1}{16}$ of a grain; with some samples it would be necessary to give $\frac{2}{7}$, $\frac{1}{2}$, $\frac{3}{4}$ grain to produce the same result. One-fourteenth of a grain of curare being the extreme dose for a rabbit of 5 pounds 7 ounces, an animal of 50 pounds weight would require as the extreme dose about $\frac{3}{4}$ grain; one of over 108 pounds double that dose, and one of 164 pounds and over $2\frac{1}{4}$ grains. The extreme dose is ascertained by injecting in a rabbit increasing doses until a lethal effect is produced, the dose immediately preceding the fatal one being the extreme dose.

Local Effects.—Swelling, pain, local and general rise of temperature, considerable redness, subcutaneous puffing, rosy-white elevation like urticaria (Voisin and Liouville, Du Cazal;

it should be remembered that injections into the skin often produce this result); painful swellings followed by abscess, which persisted several months, from the use of unfiltered solutions.

Point of Injection.—It is always better to inject into a limb, so as not to lose the resource of ligaturing in case of serious accident.

Curare,	1 grain
Distilled water,	56 minims
Glycerin,	up to 112 minims.

(Eulenburg, "Medic. Kalender," 1883.)

Curare,	1 grain
Distilled water,	up to 112 or 56 minims.

Curare,	1 grain
Glycerin,	up to 64 minims.

(*Rosenthal.*)

Curare,	1 grain
Hydrochloric acid,	10 minims
Distilled water,	up to 64 minims.

("Formulary of Vienna Hospital.")

Curare,	5 grains
Distilled water,	up to 30 minims.

(*Jousset.*)

Curare,	5 grains
Hydrochloric acid,	10 minims
Distilled water,	up to 64 minims.

Every fifth day one-third or two-fifths of a Pravaz syringe (5 to 10 min. Kunze, Edelfrei). Du Cazel used an aqueous solution, made by M. Hepp, with the addition of a few drops of alcohol; "it was more a suspension than a solution."

Preyer recommends the salts of curarine, especially the sulphate, in doses of from $\frac{1}{70}$ to $\frac{1}{14}$ grain.

Curarine,	1 grain
Distilled water,	up to 56 grains.

This was the solution which M. Beigel used, but according to M. Sachs, Preyer's curarine did not contain any active principle and was composed chiefly of phosphate of calcium.

Quite recently Dr. G. Lehmann, of Munich,[26] made use of the following solution:

Sulphate of curarine,	1 grain
Cherry-laurel water,	12 minims
Distilled water,	up to 96 minims.

The effects observed in animals after a dose of $\frac{1}{20}$ grain are —paralysis, more or less pronounced, convulsions of the limbs, increased excitability of muscular and cutaneous reflexes, superficial respiration; *in poisonous doses*, forced expiration, progressive enfeeblement of the heart's action, involuntary urination, salivation and lachrymation. In a healthy man after a dose of $\frac{1}{4}$ grain the pulse rose from 74 to 90 beats in the first minute and then sank to the normal rate. After 5 minutes there were occasional disturbances of vision, tendency to vertigo, feeling of oppressed breathing and general debility. The pupils were normal. The symptoms had vanished in two hours. The reflexes were normal, but there was sense of weight and oppression of the head. The same symptoms were observed after doses of $\frac{1}{14}$ grain to $\frac{2}{4}$ grain.

Sulphate of curarine administered internally in doses of $\frac{2}{4}$ to $\frac{5}{4}$ grain produced similar results in from 20 to 30 minutes after its administration. M. Lehmann, who administered sulphate of curarine in cases of maniacal excitement, found no benefit result from its use.

Therapeutic Uses.—Tetanus (Vulpian and Mance, Follin, Gintrac, Richard, Cornaz, Gherini, Lochner, Demme, Neudorfer); epilepsy (Mandl, Benedikt, Voisin and Liouville, Du Cazal, Kunze, Edelfrei, Bourneville and Bricon). We have used at the Bicêtre hypodermic injections of a 2-per-cent aqueous solution of curare in the treatment of epilepsy; we have practised more than 3000 injections, and we have only rarely observed slight local accidents (ecchymoses and indurations), and these of short duration); hydrophobia (Fauvel, 1864, Vulpian, Offenberg); chorea, strychnine poisoning (Richter, Burow, Corona), convulsive tic (Gualla); meningitis (Landerberger). Curarine has only exceptionally been employed, by Busch and Beigel among others. This last observer injected it in a case of epilepsy, without effect, up to a dose of over $\frac{1}{6}$ of a grain.

[According to Waring, "Manual of Practical Therapeutics," 4th edit., 1886, the dose of curarine hypodermically is $\frac{1}{20}$

to $\frac{1}{100}$ of a grain. He says—"that curare controls the spasms of *tetanus* and *hydrophobia* is beyond question, but how far it is really effectual in promoting an actual cure has yet to be shown. The best mode of administration is to inject hypodermically $\frac{1}{10}$ gr. in aqueous (filtered) solution (10 minims of a 1 per cent solution)."—*Trans.*]

DATURINA. EXTRACTUM STRAMONII.

Daturine. Extract of Stramonium.

A basic principle extracted from the leaves and seeds of *Datura Stramonium* (Solanaceæ). [It is not a chemical individual, but consists of atropine (recognized as such by Planta), contaminated with more or less hyoscyamine.—R.] It is sparingly soluble in water (1 in 288), but freely soluble in alcohol, less so in ether.

Chief Physiological Actions.—In small doses ($\frac{1}{40}$ to $\frac{3}{40}$ grain): dilatation of the pupils, dryness of the throat and mouth, dysphagia, intense thirst, slight increase of pulse and respirations, increased blood pressure, increased intestinal contractions, elevation (not constant) of temperature, heaviness of the head, slight excitement with tendency to movements (the legs are unsteady and give way), lassitude, occasional delirium, profound sleep. Variable phenomena, visual troubles (diplopia, etc.), erotic dreams, pollutions (Oulmont and Laurent). Pricking sensations and tremors (Schroff).

A larger dose produces a condition precisely analogous to drunkenness, the visual troubles are more decided, the iris completely invisible (never amblyopia).

In Large Doses.—Dysphagia, dryness and burning of the throat, hoarseness of the voice, sometimes absolute aphonia, rapid respiration which becomes jerky and sighing, rapid cardiac action, fall of temperature and of arterial tension, intestinal paralysis, pallor, chilliness with clammy sweats of the extremities. Sometimes, from the beginning, hallucinations, general convulsions, frequent desire to urinate, with or without priapism, coma, urgent thirst, and headache on awaking. Messrs. Oulmont and Laurent have never seen erythema.

In Very Large Doses.—The phenomena resemble intermittents (M. Laurent after an injection of $\frac{1}{12}$ grain has observed intermittent symptoms persisting for several days),

and there is arrest of the heart beats; peripheral sensibility is only blunted in poisonous doses. Daturine exerts its action especially on the great sympathetic; in small doses it diminishes the capillary circulation—in strong doses it determines vascular paralysis (Oulmont and Laurent).

After death in animals there are found intense injection of the meninges, and frequently hemorrhagic extravasations at the base of the brain—there are no changes at the point of injection.

Elimination is rapid and is chiefly effected by the kidneys (Oulmont and Laurent). Daturine is *antagonized* by physostigmine (Amagat). *Local effects* are nil.

Extract of stramonium, .	1 grain
Distilled water, . . .	up to 64 minims.

Dose.—4 to 12 minims.

(*Lorent.*)

Therapeutic Uses.—Pulmonary emphysema (Lorent), neuralgia (Oulmont and Laurent), tetanus, various forms of tremor (shaking palsy, etc.).

[According to Waring, daturine may be given hypodermically in *acute mania,* in doses of $\frac{1}{120}$ to $\frac{1}{60}$ grain, but it is less useful than atropine or hyoscyamine.—*Trans.*]

DIASTASE.

(*See also Injectiones Nutrientes Hypodermicæ.*)

Soluble in water, insoluble in alcohol. Diastase has been injected by Küssmaul in doses of $1\frac{1}{2}$ to 3 grains, in watery solution, in diabetes mellitus, without diminution of the sugar in the urine (diminution occurred after intravenous injection).

DIGITALINUM. TINCTURA DIGITALIS.

Digitaline. Tincture of Digitalis.

[Digitalin, as usually found in commerce, is a mixture of various neutral principles extracted from digitalis, the activity of which appears to depend upon the proportion of the exceedingly energetic digitoxin contained therein.—R.] It is practically insoluble in water, fairly soluble in ether, freely soluble

in alcohol and in chloroform. The degree of solubility varies with the sample of digitalin.

The composition of samples of commercial digitaline is very various, and it is, moreover, difficult to obtain it in a state of purity; we therefore think it preferable to recommend the use of preparations of the plant.

Digitalin, digitalein, and digitoxin produce effects similar to those produced by digitalis leaves. Digitoxin possesses the most intensely poisonous properties of the three. The products of decomposition, digitaliresin and toxiresin, are convulsants: they have been the subjects of investigation by Dr. Schmiedeberg and our friend Dr. H. Perrier; they are not used. [As commercial "digitalin" is so uncertain in its composition, it ought to be entirely discarded. Or, at all events, the maker's name, or the process by which it is prepared, for instance "Digitaline crystallisée, *Codex*," should be specified.—R.]

Principal Physiological Effects.—Diminution of frequency of the pulse beats with increase of arterial tension, fall of temerature, increased diuresis, diminished perspiration (Gubler).

In Poisonous Doses.—The symptoms are reversed.

Elimination is slow and the effects are cumulative.

Local Effects.—In a case of heart disease with general œdema, ten drops of an alcoholic solution of digitalin ($= \frac{1}{40}$ grain) produced, in addition to sharp pain at the time of injection, a comparatively large slough (Luton). Courvat, in 1871, had already observed the local irritant action of digitalin. The solution of Pletzer is also irritating, but that made use of by Prof. Eulenburg, prepared freshly, has according to him no local irritant action. The injections administered by Gubler do not occasion local accidents, except slight transient pain and burning. M. Guarda, with a solution of $\frac{1}{4}$ grain in 16 minims of water, produced an erysipelatous swelling. Witkowski has observed grave local accidents (phlegmon, etc.). Digitoxin (not in use) causes phlegmons when administered hypodermically, even in extremely small doses.

Digitalin (Merck's), . . .	1 grain
Glycerin, ...	600 minims
Distilled water, . . .	up to 880 minims.

16 minims $= \frac{1}{55}$ grain.

(*Witkowski.*)

Digitalin (Merck's), ... 1 grain
Glycerin, ... 1 minim
Distilled water, . . up to 12 or 24 minims.
(*Otto.*)

[This solution is inconveniently strong; one minim = $\frac{1}{24}$ — $\frac{1}{12}$ grain of digitalin.—*Trans.*]

Francque has used tincture of digitalis, Lorent uses digitalin dissolved in glycerin.

Digitalin, ... 1 grain
Glycerin, ... 12 minims
Distilled water, . . . up to 96 minims.

Four minims of this solution are equivalent to $\frac{1}{3}\frac{1}{2}$ grain of digitalin. (*Pletzer.*)

[I have altered this formula, the quantities given in the French Edition being manifestly erroneous.—*Trans.*]

Fronmüller makes use of an aqueous solution, which must always be shaken before use, and Erlenmeyer of a perfectly clear aqueous solution of 1 in 20.

Digitalin, ... 1 grain
Alcohol, ... 112 minims
Distilled water, . . . up to 224 minims.
4 minims = $\frac{1}{5}\frac{1}{6}$ grain of digitalin.
(*Eulenburg.*)

Digitalin, ... 1 grain
Alcohol (95%), ... 9 fluidrachms
Distilled water, . . . up to 1120 minims.
16 minims = $\frac{1}{7}\frac{1}{0}$ of a grain.
(*Adrian.*)

Pletzer, Fronmüller, Erlenmeyer, Eulenburg, etc., used the digitalin of Walz, which is soluble in 125 parts of cold water, whilst the digitalin of Nativelle is insoluble.

Gubler has used a solution of one in five hundred of Homolle and Quévenne's amorphous digitalin in a mixture of alcohol and water in equal proportions; 16 minims of this solution are equivalent to $\frac{1}{3}\frac{1}{5}$ grain of digitalin.

Homolle and Quévenne's digitalin, 1 grain
Alcohol, ... 280 minims
Distilled water, . . . up to 560 minims.
(*Gubler.*)

Eight minims are equal to $\frac{1}{7}\frac{1}{0}$ grain of digitalin.

Therapeutic Uses.—Heart diseases (Eulenburg, Fronmüller, Guala), mental diseases (Otto).

[The use of digitalis hypodermically is not as a rule desirable. According to Dr. Wood, of Philadelphia, tincture of digitalis causes less irritation when injected subcutaneously and is otherwise preferable.—*Trans.*]

DUBOISINE.

An alkaloid obtained from *Duboisa myoporoides*, a shrub half-way between the Solanaceæ and Scrophulariaceæ (Lanessan); chemically and physiologically identical with hyoscyamine (Ladenburg, Berner), very little soluble in water, freely soluble in alcohol, ether, chloroform, benzol and bisulphide of carbon (Gerrard).

Physiological Actions.—Mydriasis, arrest of sweat secretion, dryness of the throat, hyperæsthesia, quickened pulse, cephalalgia, vertigo. Tetanus in frogs (Sidney Ringer), somnolence, general enfeeblement. According to Dr. Ringer its action is the opposite of that of jaborandi and pilocarpine, and also of muscarine (rapidity of heart beats is diminished by the latter). Binz says: We see that these effects resemble those of atropine, and that it forms with the latter, daturine, hyoscyamine, and hyoscine a sort of ascending series.

Sulphate of duboisine,	1 grain
Distilled water,	up to 1 ounce 45 minims.

From one and a half to three minims of the solution contain $\frac{1}{350}$ to $\frac{1}{175}$ grain of salt.

M. Dujardin-Beaumetz has observed some poisonous symptoms with daily doses of $\frac{1}{280}$ to $\frac{1}{140}$ grain in a solution of 1 in 2,000, in the treatment of exophthalmic goître; he therefore recommends a lapse of some days between the injections. Three drops of a one-per-cent solution inserted into the conjunctival cul-de-sac produced symptoms of poisoning.

Therapeutic Uses.—Exophthalmic goître (Dujardin-Beaumetz, Desnos, $\frac{1}{140}$ to $\frac{1}{70}$ grain), night sweats (Blake, $\frac{1}{70}$ grain), asthma (Bancroft).

[Gubler uses this remedy hypodermically in the sweating of phthisis, and also in cases of acute mania.—*Trans.*]

EMETINA.

Emetine.

Pure emetine, an alkaloid of ipecacuanha, is very sparingly soluble in cold water (1 in 1,000) and in ether, is readily soluble in alcohol, chloroform, carbon bisulphide and fixed and essential oils (Podwyssotzki). The nitrate of emetine is soluble, 1 in 100 parts; the sulphate of emetine is the most soluble salt.

Principal Physiological Effects.—In doses of $\frac{1}{4}$ to $1\frac{1}{2}$ grains, burning taste, salivation, nausea, vomiting, diarrhœa, profuse sweats. During the period of nausea and vomiting, quickening, then slowing, of the heart-beats and of respiratory movements (Ackermann), fall of temperature. According to Messrs. d'Ornellas and Gubler, emetine injected hypodermically produces the emetic effect much more slowly (about 40 minutes) than by the stomach. Vomiting accompanies elimination from the stomach. In frogs there is loss of spinal reflex irritability and paralysis of the peripheral motor nerves and of the muscles (Weyland, Pécholier, Harnack).

In Poisonous Doses.—Extreme muscular debility, collapse and death ($\frac{3}{4}$ grain in a cat, and $1\frac{1}{2}$ to $4\frac{1}{2}$ grains in a dog).

Emetic Doses.—One-fourteenth to two-sevenths of a grain (Nothnagel and Rossbach). According to Gubler, it is necessary to give not less than 3 to $4\frac{1}{2}$ grains to produce the same effects as are obtained by 16 to 24 grains of powdered ipecacuanha. The human subject can tolerate considerable quantities of it, especially if it is injected in the subcutaneous cellular tissue; even to $3\frac{1}{2}$ grains introduced several times. It is possible to obtain no poisonous effect from it—not even any inconvenience. The doses indicated as emetic by the hypodermic method by M. d'Ornellas are, on the other hand, very small, viz., from $\frac{1}{16}$ to $\frac{1}{14}$ grain. Fonssagrives recommends a dose of $1\frac{1}{2}$ grains hypodermically; Dyce Duckworth, $\frac{1}{24}$ grain.

Local Effects.—In the practice of Eulenburg, injection did not appear to induce pain; there remained only at the point of puncture a trifling redness which soon disappeared (the child was suffering from capillary bronchitis and died the following day). Sir Dyce Duckworth found on one occasion slight induration. Applied to the skin emetine produces inflammation and pustules.

Emetine (pure), ...	3 grains
Sulphuric acid, ...	1 minim
Distilled water, ...	up to 48 minims.

One minim = $\frac{1}{16}$ grain.

(*Eulenburg.*)

This author injected this dose several times in a case of acute capillary bronchitis in a child without any effect.

Emetine (pure), ...	1 grain
Distilled water, . .	up to 140 minims.

One-tenth of a syringe or 2 minims ($\frac{1}{70}$ grain) to be injected every five minutes till the desired result is obtained. "Pharmacop. of Vienna Clinics," and "Klin. Recepttaschenbuch." This solution is apt to produce suppuration; it is necessary to acidulate it, to effect solution of the emetine.

ERGOTÆ EXTRACTUM; ERGOTINUM; ERGOTININA.

Extract of Ergot; Ergotina; Ergotinine.

The extracts, prepared *in vacuo*, by Grandval of Rheims, and by Berjot, of Caen, the ergotine of Bonjean, of Chambéry (which is an aqueous extract of ergot of rye), the alcoholic extract of Wiggers, the ergotinine of Tanret, the hydroalcoholate of Yvon, as well as the ecboline and ergotine of Wenzel and others are nothing more than mixtures of the soluble principles contained in ergot. (See the section on Sclerotinic Acid.)

We think that preference should be given, for hypodermic purposes, to the ergotins of Bonjean and especially to that of Yvon (16 minims of the latter are equivalent to 16 grains of ergot, and even more if the fluid is concentrated) which is perfectly stable, salicylate of sodium and cherry-laurel water being employed in its preparation. M. Schmitt says that the method by which Yvon's extract is prepared is tedious and awkward ("Répertoire de Pharmacie," 1880, p. 294). [The extractum ergotæ of the U. S. Ph., and the so-called "purified ergotin" of commerce, which contains all the alcohol-soluble constituents with exclusion of the inert water-soluble ones, is considered by competent authorities to be equally reliable.—R.]

Wigger's ergotine is soluble in alcohol, but insoluble in

water and in ether; Bonjean's, on the other hand, is soluble in all three vehicles.

Dr. Kobert has obtained three new principles from ergot which he names ergotinic acid, sphacelinic acid and cornutin. This author has only experimented on the lower animals. [The results obtained by various observers are vague and contradictory. This discordance is probably due to differences in the preparations used, to uncertainty in composition, and to changes which have occurred in them by keeping.] We certainly do not seem to have arrived as yet at a definite knowledge of the active principles of ergot. Uncertainty increases with fresh researches, and many of the variously named active principles are but imperfectly known, and confounded with one another.

Chief Physiological Actions.—In therapeutic doses, so far as we know, no abnormal phenomenon has ever been observed. In man, large doses (ʒ ij.), or long-continued small doses, produce the following symptoms: vertigo, weight of head, feeling of lassitude, tinglings, numbness of the ends of the fingers and toes, fugitive pains, convulsive paroxysms (clonic and tonic), sometimes epileptiform and accompanied by contractions, violent pains and cutaneous anæsthesia, erysipelatous swelling followed by gangrene. There is contraction of the involuntary muscular fibres of the uterus, blood-vessels, etc. The effects observed on the circulation are absolutely contradictory. According to Trousseau and Boissarie, ergot has the property of accumulating in the system and may then produce, after long-continued small doses, an onset of gangrene.

Local Effects.—All the preparations of ergot when injected hypodermically cause intense persistent pain and inflammatory symptoms. Dr. Eulenburg states that he has not observed pain from the use of Bonjean's ergotin.

[This quotation appears to be inaccurate. In the "Handbook of Therapeutics," loc. cit., p. 468, Prof. Eulenburg recommends Bonjean's ergotin 2.5, glycerin and distilled water, of each, 7.5, 1 to 2 syringefuls = 2¼ to 4½ grains of the extract, and he adds "the injection of this solution is always somewhat painful, and is often accompanied by the formation of small obstinate lumps or indurations at the seat of puncture." I have repeatedly used the ergotin in tabloids of Messrs. Burroughs and Wellcome, and find that if injection is made deeply

into the muscular substance there is no pain beyond that caused by the prick of the needle, and there are no unpleasant local after-effects.—*Trans.*]

M. Luton has seen inflammatory indurations and gangrenous abscess after the injection of 16 grains of ergotin (Grandval's extract) in solution in water. The same author states that he has never seen suppuration result from the injection of 16 minims of a 1 in 50 alcoholic tincture which he recommends. Drs. Dujardin-Beaumetz, Bourneville and Gœnner state that Yvon's ergotin never entails local accident, and Messrs. Bénard and Herrgott likewise have not met with pain, induration, or other local trouble from its use.

Aqueous extract of ergot, . . 2 grains
Glycerin, ... 12 minims
Distilled water, . . . up to 24 minims.
Twelve minims = 1 grain of extract.
(*Albanese.*)

Ergotin, ... 4 grains
Cherry-laurel water, . . up to 24 minims.
Dose.—12 to 16 minims for one injection, to be given every 2 or 5 days. (*Vidal.*)

This was used in the treatment of prolapsus ani, the injections being made in the neighborhood of the anus; cure in 20 days. We have used ergotin at the Bicêtre in the treatment of this affection. The injections, which were practised daily, produced at first no local accident, but after a time two abscesses formed which were followed by cure of the prolapsus. We used a solution of 4 grains of Bonjean's extract in equal parts of glycerin and water up to 32 minims. M. Jette asserts that either Bonjean's or Yvon's ergotin may be used, but that all others should be rejected.

The duration of treatment varies from a few days to several weeks.

[When "ergotin" (or "ergotine") without any further specification is prescribed, or mentioned by an author, the nationality of the latter may help to decide, what preparation is intended. A French physician or writer would probably mean Bonjean's preparation. In this country (U. S.), either the latter or "purified ergotin" (a purified extractum ergotæ,

U. S. Ph.) may be dispensed. There is no fixed definition of the term "ergotin."—R.]

Ergotin,	3 grains
Glycerin,	2 minims
Water,	up to 18 minims.

(*Hildebrandt.*)

Ergotin,	2 grains
Glycerin,	16 minims
Distilled water,	up to 32 minims.

(*Moutard-Martin and others.*)

Terrier used this solution of double strength in the treatment of metrorrhagia due to uterine fibroid. Sixteen minims were injected daily.

Ergotin (Yvon),	12 grains
Water,	up to 96 minims.

(*Dujardin-Beaumetz.*)

Peton and other authors state that they have found this ergotin produce pain and indurations.

Ergotin,	2 grains
Distilled water,	up to 32 minims.

(*Bucquoy*).

Dr. Eulenburg observed slight pain but no local inflammation from 16 minims of this solution.

Dr. Jaccoud administers 2, 3, and 4 daily injections of 16 minims of the following solution in the treatment of hæmoptysis, unaccompanied by pyrexia, in tubercular phthisis.

Ergotin,	4 grains
Glycerin,	18 minims
Cherry-laurel water,	9 minims
Distilled water,	up to 48 minims.

Ergotin,	1 grain
Alcohol,	32 minims
Glycerin,	up to 84 minims.

Dose.—6 to 12 minims = $\frac{1}{14}$ to $\frac{1}{7}$ of a grain of ergotin.

(*Eulenburg.*)

This solution was used successfully in a case of convulsive cough in a child of 4 years; 11 injections were made in 20 days.

Ergotin, ... 6 grains
Alcohol,
Glycerin, ... of each, 6 minims
Water, ... up to 24 minims.
(*Stephano Tolini.*)

Extract of ergot, ... 4 grains
Glycerin, ... 20 minims
Water, ... up to 48 minims.
Dose.—16 to 32 minims.

Ergotin (Bonjean), . . . 16 grains
Chloroform, ... 4 minims
Water, ... up to 64 minims.

Each minim contains $\frac{1}{4}$ of a grain of ergotin. The chloroform is added to the solution to make it keep well for a considerable time and to lessen the pain of the injection; the proportion of chloroform, however, does not seem to be sufficient to effect this purpose.

Ergotinine, ... 2 grains
Lactic acid, ... 1 minim
Alcohol, ... 22 minims
Cherry-laurel water, . . . 220 minims.
Water, a sufficiency to make . . 1120 minims.
Sixteen minims contain $\frac{1}{3\frac{1}{3}}$ of a grain of ergotinine.
(*Tanret and Dujardin-Beaumetz.*)

[Ergotinine (Tanret's) is a feeble base.—R.]

Colic and vomiting were produced when the dose exceeded $\frac{1}{14}$ of a grain. No effect followed until a lapse of from 2 to 24 hours.

Prof. Eulenburg ("Deutsche med. Wochenschrift," 1883, No. 44) has used Gehe's ergotinine in the treatment of headache, neuralgia, Basedow's disease, and nocturnal incontinence of urine. There was hardly any pain, and no local troubles resulted. The dose ranges from $\frac{1}{7\,0\,0}$ to $\frac{1}{7\,0}$ of a grain.

Therapeutic Uses.—All forms of metrorrhagia (Reuben, Landmann), rectal prolapse (Vidal, Perrotin, Michel), retention of urine (Luton), uterine fibroids (Hildebrandt); it has been asserted that injections of ergotin by Hildebrandt's method cause reduction of fibro-myomata, but we cannot find any recorded cases which indisputably bear out this statement); hemicrania (Berger), cephalalgia (Lebert, Eulenburg),

Basedow's disease (Eulenburg), poisoning by carbonic oxide (Remak), hæmoptysis (Drasche, Ritchie and others; Cavalieri in a case of hæmoptysis used a 1 in 2 aqueous infusion of ergot of rye. Observe in passing that if it is desired to obtain a successful result from the use of ergot in these cases, it is absolutely essential that the middle tunic of the vessels should be healthy throughout); hæmatemesis, epistaxis, bleeding hæmorrhoids, varices (P. Vogt), aneurism (Langenbeck: injection between the skin and tumor. Schwalbe attributes the success of Langenbeck and P. Vogt to the irritant and inflammatory local effects of the alcohol used as a vehicle. We are inclined to share this opinion in regard also to other hypodermic solutions of ergotin, that, for instance, used by M. Vidal in the treatment of rectal prolapse. Rouge, Albanese, Eulenburg and others), Werlhof's disease or purpura hæmorrhagica (Piaza of Palermo), hæmaturia (Luton), dangerous hemorrhage resulting from rupture of the bulbous portion of the urethra (Albanese, who used it successfully) splenic leucocythæmia (Da Costa found that it diminished the spleen), varicocele (Wycisk), neuralgia (Marino, of Palermo), diabetes, various kinds of convulsion (Corrigan), phthisical cough (Allan).

The alcoholic tincture recommended by M. Luton in 16-minim doses, which according to this author never produced suppuration, does not appear to have been free from irritating properties in the hands of M. Stocquart.[27]

Ergot of rye is often administered in an empirical haphazard fashion to promote uterine contractions. We may recall the fact that the best modern accoucheurs, among others, Naegele, Schröder and Playfair, condemn this practice, which is dangerous alike to mother and child on account of the persistent spasmodic contraction which it induces. Moreover, the danger of premature closure of the os before the third stage of labor is completed must not be forgotten. For these and other reasons, which it is unnecessary to enlarge on here, ergot and its compounds ought not, in our opinion, to be employed under any circumstances in the pathology of parturition. In short, we think that the indications for the use of ergot are comprised within a very narrow compass.

[I am indebted to my friend Dr. Halliday Croom, of the Edinburgh Medical School, for the following prescription,

which, he assures me, causes neither inflammation nor abscess:

Ergotin, ...	120 grains
Chloral hydrate, . . .	20 grains
Water, to make, ...	1 fluidounce.

S. Thirty minims for one injection.

The formula in the last edition of the "British Pharmacopœia" is as follows:

Ergotin, . . .	100 grains or 1 part
Camphor water, .	200 fluid grains or 200 parts

Dose.—3 to 10 minims.—*Trans.*]

ESERINA.

(*See Physostigmina.*)

EUCALYPTOL.

Eucalyptol is soluble in alcohol and practically insoluble in water; it is an antifermentescent and antiputrescent. This agent produces, in doses of from 32 to 64 grains, cephalalgia, physical and mental prostration, loss of reflexes, failure of respiration, fall of blood pressure and temperature. *In Poisonous doses* death occurs from arrest of respiration. *Therapeutics.*—Eucalyptus and its derivatives have been often used successfully both internally and externally in a great variety of diseases, but eucalyptol has only been administered subcutaneously by Dr. Sloan, who states that he has saved patients suffering from severe puerperal fever.

[A paper by Dr. Sloan on the use of eucalyptus oil in midwifery will be found in Braithwaite's "Retrospect," vol. 86, p. 278.—*Trans.*]

FERRUM.

Iron (and its Salts and Preparations: Dialyzed Iron—Pyrophosphate of Iron—Citrate, Tartrate and Lactate of Iron—Peptonate of Iron).

Dialyzed iron, diluted and undiluted, has been used by Da Costa in doses of 15 minims in cases of anæmia. M. Luton has injected it in doses of 3, 5 and 10 minims; "deprived of its styptic and astringent properties, it is nearly as well borne by the cellular tissue as perfectly neutral solutions of morphine, it is rapidly absorbed and locally gives rise to nothing more

than a trifling nodosity, which, however, persists for a considerable time. The immediate effects are similar to those of an energetic diffusible stimulant, a sense of warmth more agreeable than painful is diffused throughout the body, the arteries pulsate strongly, the countenance is flushed, there is increased mental activity, rapidity of thought and desire for exercise. In a word, one might admit, as it were, a species of ferric intoxication, which borders afterward upon a decidedly feverish condition. These effects last some time, proportionally to the dose injected, and are never followed by prostration, but by a certain degree of anorexia. M. Luton has also observed a reawakening of the generative desire, and a love of dress (not of a sombre hue). Nasse, after using a 5 per-cent solution, abandoned it on account of the violent inflammation produced by the injections.

The pyrophosphate of iron (with ammonium citrate) has been used hypodermically in cases of severe anæmia and chlorosis by Messrs. Huguenin, of Zurich, in 1876, Wychinski (with the addition of a small quantity of albumen), N. Neuss (1881) who in one-third of his cases observed signs of local irritation, Lippert, Nasse (for abscess), Messrs. Martensen (1876), Rosenthal (1878) and Neuss employed pyrophosphate of iron with citrate of sodium.

[Pyrophosphate of iron, prepared by double decomposition between pyrophosphate of sodium and a ferric salt, is insoluble. When combined with the citrate of an alkali, however, it is readily soluble. The pyrophosphate of iron of the U. S. Ph., previous to the last revision, contained citrate of ammonium, which was replaced by citrate of sodium, as this renders the compound more permanent.—R.]

Pyrophosphate of iron (with ammonium citrate), . . . 3 grains
Distilled water, . . . up to 16 minims.
(*Huguenin.*)

[Sixteen minims of this solution are equivalent to about $\frac{1}{3}$ grain of iron.—*Trans.*]

Pyrophosphate of iron (with sodium citrate), ... $2\frac{1}{2}$ grains
Distilled water, . . . up to 16 minims.
Eight to sixteen minims for a dose.
(*Martensen, Rosenthal, Eulenburg.*)

The solution should be prepared as required and kept in a cool place. Iron is detected in the urine thirty minutes after injection. Messrs. Nasse and Rosenthal have often met with local accidents after its administration.

The *citrate of iron and ammonium* has been administered subcutaneously by Messrs. Quincke (1867), Ciamarelli (1879) Vincenzio Gauthier, of Naples (¾ grain to 16 grains), and that with success, in cases of anæmia which have resisted all other methods of treatment by iron. The presence of iron was detected in the urine; locally there was a sense of burning, but not to an insupportable degree.

The *citrate of iron* is recommended by M. Glœveke of Kiel [28] and by Martinetti, in doses of 1½ grains, in a ten-per-cent solution, for adults. Chiara (1885) has used it with benefit and without local mishaps.

Citrate of iron,	2 grains
Cherry-laurel water,	up to 24 minims.

The *tartrate of iron* [probably "tartrate of iron and ammonium."—R.] used by Rosenthal in aqueous solution (3½ grains in 16 minims) produced local accidents, such as redness, swelling, and persistent hardness. He also used the *lactate of iron,* after Eulenburg's researches. M. Luton has experimented on himself with a solution (1 in 10) of lactate of iron. He found it impossible to inject it so as to cause absorption.

M. Bouchut has made injections with perchloride of iron and, naturally, has caused very considerable sloughs.

Finzelberg's *peptonate of iron* has been used hpodermically by M. Nasse since 1879 in cases of insanity, with benefit and without local troubles. Sixteen minims of a one-in-ten solution boiled and filtered represent 1½ grains of peptonate of iron and nearly ⅓ grain of oxide of iron. The solution should be kept in a cool place and prepared fresh whenever it becomes turbid.

Pepsin (dry),	5 grains
Solution of chloride of iron,	6 minims
Glycerin,	55 minims
Water of ammonia,	10 minims
Cherry-laurel water,	up to 240 minims.

(*Jaillet and Quillet.*)

A Pravaz syringe, or 16 minims, is equivalent to $\frac{1}{3}$ of a grain of pepsin and $\frac{3}{4}$ of a grain of the iron salt.

This solution causes neither pain nor local inflammation if it is injected at a temperature of 98.5° to 100° F.

More recently M. Jaillet has suggested the following formula for injection:

Chloride of iron (ferric), sublimed, .	1 grain
Pepsin (dry), ...	2 grains
Glycerin, ...	40 minims
Distilled water, . .	60 minims or a sufficiency.

1. Dissolve the pepsin in a small quantity of water and add the glycerin. 2. Dissolve the chloride of iron in the remainder of the water and mix the two solutions. 3. Add finely powdered, dry sodium carbonate until the liquid is entirely neutral. 4. Complete the solution by adding distilled water to make up the product to 112 minims, and finally filter. This solution keeps better than the preceding.

M. Rosenthal, of Vienna, recommends, when the stomach is intolerant of ferruginous preparations, hypodermic injections of a 1-in-20 solution of iron peptonate in olive oil. It never produces inflammatory troubles. The same author has used a 1-in-10 solution of iron peptonate.

Albuminate of iron was first used by Dœnitz of Tokio (1879) as a solution of iron sesquichloride with albumen. Friedländer's 1-per-cent solution of iron albuminate speedily became turbid and was very unstable (Neusse). [There is no definite process or formula for "albuminate of iron" and similar preparations. It is probable that many experimenters have used preparations, the exact composition of which was not known. Very little reliance can, therefore, be placed upon their reports. —R.]

In 1880 Goldmann used the following solution with success:

Pyrophosphate of iron, . . .	3 grains
Albumen, ...	4 grains
Distilled water, ...	up to 16 minims.

According to Eulenburg ("Berlin. klin. Woch.," 1883, No. 2), Drees' solution of iron albuminate was found useful in hypodermic injections.

Albuminate of ammonio-citrate of iron [?] has been sug-

gested by M. Vachetta; he has, however, only tried it in animals.

We will not discuss here injections of iron in nævi, varices, aneurisms, etc.

GELSEMII TINCTURA. GELSEMINA.

Tincture of Gelsemium. Gelsemine.

Chief Physiological Effects.— Gelsemine paralyzes the motor centres of the brain and the respiratory centres (Berger, Moritz, Ott); it first increases, then diminishes reflex excitability of the spinal cord and the cardiac contractions. These symptoms are complicated with weight of head, vertigo, diplopia, impeded movements of the tongue, tremor of the hands, numbness of the fingers, nausea, vomiting, dyspnœa, feeling of general cold (Berger), mydriasis after instillation into the eye (Moritz). The lethal dose of Sonnenschein's gelsemine, according to Moritz, would be from about $\frac{1}{2}$ to 1 grain [this is a *serious* error. The alkaloid *gelsemine* is a most energetic poison, and its dose is given, with some hesitation, by several authorities (for instance, Prof. H. C. Wood) as between the 200th and 300th of a grain. The quantity mentioned in the text probably refers to the eclectic "resinoid" gelsemin. —R.], and from $\frac{8}{4}$ to $\frac{1}{2}$ a grain of liquid extract.

Hydrochlorate of gelsemine,	. . 1 grain
Distilled water,	. . . up to 210 minims.

From $1\frac{1}{2}$ to 3 minims, equivalent to $\frac{1}{40}$ to $\frac{1}{70}$ of a grain of salt. The hydrochlorate is more active than gelsemine itself. It produces insensibility at the point of injection.

Therapeutic Uses.—Tincture of Gelsemium sempervirens has been successfully used in the treatment of neuralgia by Drs. Jurasz, Wickham Legg, Thomson, Clarke and others, and without benefit by Messrs. Berger, Wolfe and others. Prof. Eulenburg has injected sometimes the tincture or aqueous extract of gelsemium, at others gelsemine (soluble in 116 parts of water), or again, an aqueous solution of the hydrochlorate —1 in 200 parts. This last, which is much more active than gelsemine, had already been recommended by Sonnenschein.

GLYCERINUM.

Glycerin.

Glycerin is one of the most valuable solvents for hypodermic preparations; it is, however, of great importance to use it chemically pure so as to avoid its irritant action. Glycerin is frequently administered by the mouth in various affections; it is thus used frequently as a substitute for cod-liver oil, but in such cases the doses required are too large to permit of its being used hypodermically. See in the Introduction the table borrowed from the essay of M. Surun showing the solvent power of glycerin.

GUACHAMACA.

Guachamaca (Extract of).

Guachamaca is the native name of a tree recognized by Hooker as *Malonetia nitida* Spruce (nat. ord. Apocynaceæ), which grows in Venezuela. The active principle is chiefly contained in the bark and in the various layers of the liber. The extract, dark-brown and resinous, bearing an outward resemblance to the appearance of curare, is soluble in water, slightly so in absolute alcohol, and insoluble in ether and chloroform. The chief difference, according to M. Schiffer, between the action of this substance and that of curare consists in the fact that guachamaca appears to act rapidly on the nerve-centres, whilst curare affects them slowly.

M. Schiffer has as yet used it but seldom in the human subject by the hypodermic method. In a case of spasmodic muscular contracture he injected a Pravaz syringeful containing $\frac{1}{7}$ of a grain of dried extract. He observed in three-quarters of an hour a light, and then profound, slumber which lasted about three hours, the circulation and respiration remained normal, reflex excitability being preserved during the period of somnolence.

The author thinks that in this case perhaps the dose was too small to obtain the full effect; he is of opinion that the remedy should be administered for some time to obtain a curative effect in convulsive diseases. He puts forward a hypothesis that guachamaca might be useful as a hypnotic.

[A paper on guachamaca will be found in the "Lancet," vol. i., 1884, p. 723.—*Trans.*]

HOMATROPINÆ HYDROBROMAS.

Hydrobromate of Homatropine.

Homatropine, according to Fronmüller ("Memorabilien," 1880, p. 298, 1882, p. 6), does not include any of the poisonous features of atropine; its local mydriatic action is quick and decided (2-per-cent solution), and the pupil rapidly returns to the normal condition. It diminishes tubercular sweats.

Hydrobromate of homatropine, . 1 grain
Distilled water, . . . up to 80 minims.
Sixteen minims = $\frac{1}{5}$ of a grain.

[Dose $\frac{1}{12\,0}$ to $\frac{1}{2\,0}$ grain, *Martindale.*]

Neither mydriasis nor narcotic phenomena are induced, cough, expectoration and insomnia are relieved.

Dr. William Murrell has found these injections less efficacious than those of atropine. Homatropine has been used, among other remedies, in cases of poisoning by pilocarpine (Fronmüller).

HYDRARGYRUM.

Mercury. Preparations and Salts of Mercury.

(Excepting *Calomel*, which see under *Hydrargyri Chloridum Mite.*)

Bichloride of mercury is soluble in 16 parts of cold water, and freely soluble in alcohol, ether, and glycerin. Cyanide of mercury is soluble in 13 parts of cold water, and slightly soluble in strong alcohol and in glycerin. Biniodide of mercury is practically insoluble in water and in glycerin, but soluble in alcohol and in ether. In *small doses,* according to some authors, mercury is stimulating and restorative. It is antiseptic.

Chief Physiological Properties.—Stomatitis, more or less speedily produced according to idiosyncrasy or local predisposing causes, such as caries, the use of tobacco, etc., salivation, intestinal catarrh, diarrhœa. Mercurials often produce

notable slowing of the circulation and fall of temperature. Mercurial fever is generally due to local irritations produced by these preparations (Barrallier).

We omit the poisonous effects properly so-called. We will quote, however, some of the results recorded in the remarkable work of J. L. Prévost ("Étude expérimentale relative à l'intoxication par le mercure.—Son action sur l'intestin—Calcification des reins parallèle à la décalcification des os."—"Rev. méd. de la Suisse Romande" (Nov. and Dec., 1882). M. Prévost used for his physiological experiments aqueous solutions of the acid nitrate of mercury, of corrosive sublimate, and of the peptonate. The results obtained by him tend to confirm those recently obtained by Messrs. Salkowski, Rosenbach, Heilbronn, Mering, and to elucidate some hitherto doubtful points. These experiments prove that mercury is capable, at least in large doses, of producing by the hypodermic method *intestinal lesions* quite as serious as those following ingestion by the stomach, though the latter method requires larger doses to produce the same amount of mischief. These lesions mostly consist in very pronounced hyperæmia of the cæcum and large intestine with ecchymotic patches, sometimes also with ecchymosis of the vesical mucous membrane; they have also been observed by authors who have experimented with hypodermic injections of corrosive sublimate.

Experimental mercurial poisoning, whether produced by large doses administered internally, or by smaller doses exhibited hypodermically, produces, when death supervenes only after a few days, an accumulation of calcareous matter in the renal tubules, more or less pronounced according to the species of animal. The process begins in the straight tubules of the cortex, and extends afterward to the convoluted tubules as they traverse the medullary substance. This effect was first observed by Salkowski in his experiments with calomel, corrosive sublimate, and the iodides of mercury.

Several writers, among others Astley Cooper and Küssmaul, had long previously attributed to mercury and its preparations the power of exciting osseous changes. See among others the history of the painter's dog recorded by Hughes Bennett. [This case is recorded in the 5th edition of Bennett's "Clinical Medicine," p. 978, and is of great interest and importance.—*Trans.*] Some modern writers (Heilbronn, Mer-

ing, etc.), have also seen these alterations in the bones, but without associating them with the renal changes.

In one of Prévost's experiments (No. XII.), it was found that an injection of 40 grains of mercuric peptonate, which was an old and turbid preparation containing $\frac{1}{3}$ of a grain of corrosive sublimate, produced violent diarrhœa, lasting for two days, and death on the third day; at the autopsy, besides marked renal calcification, he found manifest signs of decalcification of the bones which rendered the heads of the long bones movable on their shafts.

Chronic Mercurialism.—According to Küssmaul, mercury is a brain poison, one of the most constant phenomena being the condition of timidity and embarrassment which characterizes mercurialized persons, falling out of the teeth, shrinking of the gums, chronic inflammations of the mouth and pharynx, induration of the salivary glands and of the cervical ganglia, gastric catarrh, pains in the limbs, nervous excitability, insomnia, vertigo, tremors, impairment of memory, frequently emaciation, dental neuralgia, headache, dyspnœa, tinglings, anæsthesia and analgesia.

Mercury in medicinal doses has no appreciable influence on the formation of urea; but it is generally admitted that its prolonged use is attended with diminution of globulin.

In 1880 M. Luton injected two or three globules of crude mercury into the cellular tissue of the dorsal aspect of the forearm; the operation was succeeded by a somewhat persistent induration and sometimes by slight suppuration, but absorption, nevertheless, took place. Later on he used mercury emulsified with glycerin (3 globules of fluid mercury shaken up vigorously and for some time with 16 minims of glycerin; the entire quantity was injected under the skin of the thigh behind the great trochanter). "Mercury thus treated assumes really the appearance of a grayish metallic powder, and requires a canula of large calibre to permit of its ready expulsion from the syringe." It is necessary to use a needle made of steel, and syringes, such as those made of vulcanite, the joints of which are not subject to the chemical action of the mercury. This form of injection only causes a very moderate amount of local irritation, but it is followed by persistent induration. M. Luton asserts that the advantage of this method consists in the fact that "the patient carries his remedy stored

up (emmagasiné) in himself." If the dose has been sufficient there is no need to repeat the injection, but M. Luton admits that "the supply may require renewal if the trouble has not quite disappeared, and especially if, before the desired result has been attained, the local irritation has vanished." He always obtained excellent results from the use of this method in the treatment of secondary and tertiary syphilis.

Hunter and Hebra (1864) appear to have been the first to use corrosive sublimate hypodermically, one grain in one to four drachms of water; Berkeley Hill, in England, also used hypodermic injections of mercury in the form of mercuric chloride; then come Drs. Walker and James (1869) and McCall Anderson (1870).

Messrs. Scarenzio (1864), Ambrosoli, Riccordi, Monte-Forte, Casati (1867), Max van Mons, Sigmund, Soresina (of Milan), Bertarelli (1879), etc., used injections of calomel (which see). These injections have latterly been used by preference and exclusively in the Grand Hospital at Milan.

To Dr. Lewin, of Berlin, belongs the merit of popularizing this mode of using mercury bichloride.

Bichloride of mercury, . . .	1 grain
Distilled water, . . .	up to 168 minims.

Dr. Lewin injected 12 minims of this solution, to which he sometimes added morphine and glycerin. He seldom observed local troubles as a result (abscess in 2 to 3 per cent). Messrs. Richter, Bœse, Klemm, Derblich, Wiederhoffer, Eulenburg (an aqueous solution of 3½ grains in 4 drachms and 15 minims), and Rosenthal (solution made with water and glycerin) used Lewin's method successfully. This plan of treating syphilis has been also used since its introduction with varying success by Hardy, Diday (who noted pain, abscess and sloughing), Walker, Taylor, Hansen, H. Zeissl (who used hydrarg. perchlor., gr. xvi.; glycerin., ʒ iiss.; aq. dest., ʒ v. ℥xx. Messrs. Merscheim, Grünfeld (of Sigmund's clinic) and Stohr, but especially the last author, oppose the method recommended by Lewin. Stohr, besides the inconveniences encountered by other authors, has observed general enfeeblement, febrile attacks, and, occasionally, diarrhœa. In 1863 Stohr's observations were confirmed by Uhlmann, Rosenthal, Fournier and

Kolner. Paikert did not meet with any accidents in 5,000 injections made after Lewin's method; the syringe which he used had a capacity of 32 minims. Ædsmaason also has not seen a single case of abscess.

In France, Liégeois in his turn recommended hypodermic injections of corrosive sublimate in the treatment of syphilis; he used the following solution:

Bichloride of mercury, . . .	1 grain
Glycerin, ...	160 minims
Distilled water, . . .	up to 560 minims.

Two injections of 16 minims daily into the dorsal region. In 25,000 injections he only observed suppuration thrice. Sometimes Liégeois modified his formula thus:—

Bichloride of mercury, . . .	1 grain
Hydrochlorate of morphine, . .	½ grain
Distilled water, . . .	up to 560 minims.

Messrs. Piquand (1868), Gubler, Léon Labbé, Marc Sée, Simonet, Spillmann, Hardy, Galezowsky, Giraud-Teulon, Tillaux, Diday, Dron,[29] H. Bernard (1871), Le Moaligou (1873), following in the steps of Liégeois, used that author's solutions with more or less success.

M. Bergh, of Stockholm, never met with suppuration or other accidents after hypodermic injections of sublimate, and he attributed this immunity to methodical massage of the nodule resulting from injection immediately after its production. He advises that injections should be made into parts richly provided with cellular tissue, *e.g.*, the back and shoulders. Dr. Shoemaker uses a one-per-cent solution of sublimate in distilled water; he uses gold canulæ.

M. Straub, of Strasbourg (1872), in Schützenberger's clinic, administered corrosive sublimate hypodermically in a chloroalbuminate solution, which had previously been tried by M. Lewin. The composition of this solution, which has been praised by M. Mialhe, is based on the theory that solution of mercury bichloride in contact with living tissues precipitates their albumen, and thus causes pain and other local accidents, whilst by combining it in the first place with albumen its absorption is effected without tissue changes.

a. Bichloride of mercury, . . . 20 grains
Chloride of ammonium, . . . 20 grains
Chloride of sodium, . . . 68 grains
Distilled water, . . up to 2240 minims.

b. The white of one egg,
Distilled water, . . q.s. up to 2240 minims.

Mix the two fluids and filter. Sixteen minims of the liquid are equivalent to $\frac{1}{14}$ of a grain of the salt. Le Moaligou, Sée and Grünfeld, who tried this solution, found that it was unstable, painful to use, and capable of producing sloughing and abscess. The solution of sublimate in glycerin is preferred by some authors. D'Ancona in Italy (1876) used a solution of albuminate of mercury with chloride of sodium.

Bichloride of mercury, . . . 1 grain
Chloride of sodium, ... 6 grains
Distilled water, . . . up to 112 minims.
Rub in a porcelain mortar, dissolve and filter.
(*Bamberger.*)

M. Van den Corput, of Brussels, has suggested another formula:

Bichloride of mercury, . . . 1 grain
Chloride of sodium, ... 10 grains
Distilled water, ... up to 1 ounce.
Three to five minims thrice daily, = $\frac{1}{160}$ to $\frac{1}{96}$ of a grain.

The formulæ of Dr. Stern, formulæ which recently had great publicity, differed but slightly from the preceding, the solutions being slightly more concentrated. Messrs. Rechtvall (who performed 2,937 injections, suppuration resulting in 8 to 17 per cent of the cases), Jarmay, Reder and Gschirhakl recommended the combination of sodium chloride with the sublimate.

Auspitz used the following solution:—

Bichloride of mercury, . . . 1 grain
Chloride of sodium, ... 2 grains
Distilled water, . . . up to 112 minims.

This is the solution which Abadie and Leleu used in the treatment of interstitial keratitis ("Gazette médicale de Paris," May 3d, 1884. "De la kératite interstitielle et de son traitement par les injections de bichlorure de mercure," Paris,

1884). The latter used it in 8-minim doses in children, and 16 minims in adults. Injections should be made deeply to avoid accidents.

M. Plevani adds hydrochlorate of cocaine to the solution to render the injection painless, and chloride of sodium to prevent the precipitation which would otherwise ensue from the formation of an insoluble double chloride of mercury and cocaine.

Bichloride of mercury, . . . 3 grains
Hydrochlorate of cocaine,
Chloride of sodium, . . of each 1 grain
Distilled water, . . . up to 336 minims.

Sixteen minims = $\frac{1}{4}$ of a grain of mercury salt, and $\frac{1}{21}$ of a grain of cocaine.

Martin has used biniodide of mercury subcutaneously.

Biniodide of mercury, . . . 4 grains
Distilled water, . . . up to 112 minims.

Some add 4 grains of potassium iodide to effect solution; in this way a double iodide of mercury and potassium is formed.

Sulphate of atropine, . . . 3 grains
Bichloride of mercury, . . . 20 grains
Distilled water, . . . up to 4 fluidounces.

Dose.—Eight minims. This solution did not produce irritation.

Biniodide of mercury, . . . 2 grains
Iodide of potassium, ... 4 grains
Hydrochlorate of morphine, . . $\frac{1}{2}$ grain
Distilled water, . . . up to 112 minims.

Eight minims (= $\frac{1}{4}$ grain of mercury salt) every second day.

Biniodide of mercury, . . . 3 grains
Iodide of potassium q.s. to effect solution in
Distilled water, . . up to 210 minims.

Five minims = $\frac{1}{14}$ of a grain.

(*Ragazzoni.*)

Biniodide of mercury, . . . 6 grains
Iodide of potassium, ... 50 grains
Distilled water, . up to 2 ounces 192 minims.

16 minims = $\frac{1}{12}$ of a grain of mercury salt.

Bricheteau has recommended the use of double iodide of mercury and sodium.

Biniodide of mercury,	3 grains
Iodide of sodium,	3 grains
Distilled water,	up to 240 minims.

A Pravaz syringeful (or 16 minims) contains $\frac{1}{5}$ of a grain of the mercury salt. Eight, gradually increased to 16, minims every second day. The following solution gave rise to no local reaction, was absorbed rapidly and did not coagulate albumen:

Biniodide of mercury,	1 grain
Iodide of potassium,	1 grain
Phosphate of sodium,	2 grains
Distilled water,	up to 50 minims.

Five minims = $\frac{1}{10}$ of a grain.

(*Yvon.*)

Cullingworth in 1875 used cyanide of mercury in solution in glycerin and distilled water. This author used Staub's solution at first, but, though it produced no suppuration, its administration was painful and it readily decomposed. The salt is sometimes called "bicyanide of mercury." Sigmund and Kroworzinski used it later (1876) in aqueous solution.

Cyanide of mercury,	3 grains
Distilled water,	up to 6 drachms.

Twelve minims of the solution daily = $\frac{1}{10}$ of a grain. Cullingworth asserts that it does not cause pain; it should be remarked, however, that he observed infiltration of the cellular tissue persisting for a week. Mandelbaum used, in 1878, a solution of 1 grain in 112 minims and only observed trifling pain lasting at most for an hour.

Galezowsky and Despagnet injected 4 minims (= $\frac{1}{56}$ of a grain) of the following solution:

Cyanide of mercury,	1 grain
Distilled water,	up to 224 minims.

According to Lagelouze, the above dose caused diarrhœa, vertigo, and giddiness.

Galezowsky has endeavored to substitute for hypodermic injections of mercury cyanide, which in doses exceeding $\frac{1}{14}$ to $\frac{1}{7}$ of a grain produced intractable diarrhœa, those of the double

cyanides of gold and potassium, of silver and potassium, and of platinum and potassium.

Cyanide of gold and potassium, . 2 grains
Distilled water, . . . up to 112 minims.

The dose used was from 16 to 24 minims (= $\frac{2}{3}$ to $\frac{3}{4}$ of a grain) and it was well borne.

Cyanide of mercury was particularly recommended for hypodermic use by Schütz and Prochorow. It is soluble in 13 parts of water, is neutral in reaction, has no chemical action on albumen nor on the metallic parts of the syringe, and is very stable if the solution is kept under cover from the light. It is injected in doses of $\frac{1}{14}$ to $\frac{1}{7}$ of a grain (2 per cent solution), the maximum dose being less than $\frac{1}{2}$ a grain; the injections cause less pain than those of bichloride. Discomfort lasts about two hours.

[In the original as well as in the English edition of this work, this salt is called *cyanate of mercury*, and evidently regarded as being different from *cyanide of mercury*. The fact is, that "cyanate of mercury" is a wrong translation of *Hydrargyrum cyanatum*, which, in English, is properly "cyanide of mercury." True cyanate of mercury is a different substance and has never been used in medicine.—R.]

"Two solutions have been recommended by Vienna physicians—the *albuminate* (bichloride of mercury 4½ grains, solution of albumen ten drachms and 40 minims (Bamberger), and the *peptonate of mercury*. [According to Galezowsky, the double peptonate of mercury and ammonium which he has experimented with in conjunction with Fournier has not appeared to possess any greater value.] The albuminate is difficult of preparation, and will not keep long without becoming turbid; but it is essential to inject a perfectly clear solution. Bamberger has recently experimented with the peptones which are largely manufactured in England for the alimentation of convalescents and he has obtained marked success. The two disadvantages which were encountered with albumen do not exist with regard to the peptonates; the latter are freely soluble in water, are easy of filtration, have no tendency to become turbid, and are not precipitated by heat, by acids, or by alkalies."

"The meat-peptone which Bamberger uses is prepared in

London, by Stephen Darby of Leadenhall Street. The preparation of the peptonate is very simple:—dissolve 5 grains of sublimate in 110 minims of distilled water, and make another solution of 20 grains of sodium chloride in 110 minims of water. Dissolve 1 grain of meat peptone in 55 minims of distilled water and filter; add to this 22 minims of the sublimate solution and dissolve the resulting precipitate with a sufficiency (about 16 or 18 minims) of the solution of sodium chloride, and add distilled water up to 100 minims. Cover the liquid and let it rest several days, then filter and make up to 112 minims. Sixteen minims of this solution contain $\frac{1}{4}$ of a grain of mercury in combination with peptone. The vessel is kept closed and the fluid is allowed to stand for a few days when a small quantity of white flocculent precipitate separates which, perhaps, is albumen which has been retained in the peptone. Finally, the fluid is filtered and is ready for use. This preparation, which we have seen used in the Vienna hospitals, will keep perfectly clear for at least three months. Undoubtedly, as in the case of morphine injections, we meet with instances where idiosyncrasy and susceptibility are so pronounced that we are obliged to lay aside this form of medication, but such cases are extremely rare, the great majority of patients tolerating it without any difficulty. The results of experiments made by Professors Bamberger, Zeissl, and Neumann are in complete accord; the peptonate of mercury causes less disturbance than any other preparation, the reaction consisting merely in a moderate degree of pain at the point of injection, and this would appear to be due to traumatism of the subcutaneous cellular tissue; Bamberger therefore recommends slow injection and the dispersion of the fluid by gentle pressure on the skin and by friction."

Solutions of peptonate of mercury have since been used by various authors; amongst others by Paulcke of Leipzig, Friedländer of Berlin, Neumann, Rotter, Petersen, and Oberländer.

Sublimate injected in minute doses in the form of albuminate or peptonate does not cause the slightest local irritation, provided the solution has been carefully filtered and is perfectly limpid (Nothnagel and Rossbach).

Dr. Terrillon used at Lourcine, with benefit, Bamberger's mercuric peptonate and Yvon's solution. M. Yvon, accepting the theory that the mercurial solution should not only not

excite any local action, but, moreover, should not coagulate albumen in order that it may be absorbed as rapidly as possible, has, to attain these results, prepared the following formula:

Biniodide of mercury,	2 grains
Iodide of potassium,	2 grains
Phosphate of sodium,	4 grains
Distilled water,	up to 112 minims.

He insists on the use of instruments with vulcanite mounting. If the injection is made deeply and slowly (under the skin of the back, legs, and gluteal regions) it does not cause pain or give rise to inflammatory nodosities or abscess. Occasionally there are a few indolent indurations.

M. Delpech, chemist, prepared for M. Martineau a mercuric peptonate, 16 grains of which are equivalent to four grains of sublimate (bichloride of mercury, 160 grains, Catillon's dried pepsin, 240 grains, and 240 grains of ammonium chloride). [We presume any other *good* dry pepsin will answer the same purpose. Catillon's pepsin is practically unknown in this country, where we have several brands of pepsin superior to any European make.—R.] The hypodermic solution is prepared thus—

Peptonate of mercury and ammonium,	1 grain
Distilled water,	up to 80 minims.

Twenty minims represent $\frac{1}{16}$ grain of sublimate. This solution keeps good only a few days, but the following is more stable—

Peptonate of mercury and ammonium,	1 grain
Glycerin,	16 minims
Distilled water,	up to 80 minims.

The next solution is perfectly stable.

Peptonate of mercury and ammonium,	1 grain
Glycerin,	up to 96 minims.

In conclusion, M. Martineau has administered more concentrated solutions hypodermically; they were prepared by M. Delpech and composed as follows:

Catillon's pepsin,	9 grains
Ammonium chloride,	9 grains
Corrosive sublimate,	6 grains.

This mercuric peptonate is dissolved in—

Glycerin, ...	80 minims
Distilled water, . . .	up to 120 minims.

Five minims of this filtered solution added to 23 minims distilled water, yield a hypodermic solution, 16 minims of which are equivalent to $\frac{1}{4}$ grain of sublimate. We have used this solution in children and have only observed transient indurations.

M. Besnier has used in the St. Louis hospital, since 1881, the following formula:

Catillon's dry pepsin, . . .	9 grains
Ammonium chloride, . . .	9 grains
Mercury protochloride, . . .	1–2 grains
Glycerin, ...	85 minims
Distilled water, . . .	up to 112 minims.

Sixteen minims represent $\frac{1}{4}$ to $\frac{2}{3}$ of a grain of mercury salt. The injection should be made into the lumbo-sacral muscles and gluteals. Six injections weekly, beginning with half-a-syringeful. ["Mercury protochloride" is probably here equivalent to "bichloride." The protochloride or calomel would remain absolutely undissolved by the liquid. Still, calomel *has* been given hypodermically (see below).—R.]

The peptonate of mercury prepared by M. O. Kaspar should also be mentioned.

M. Wolf, of Strasburg, uses for hypodermic injections solutions which are freshly prepared as required. These solutions are in the first place made as follows: (1) $1\frac{1}{2}$ grains of dried carbonate of sodium in 112 minims of water; (2) $3\frac{3}{4}$ grains of sublimate in 112 minims of water; (3) glycocol $2\frac{1}{2}$ grains in 112 minims. (The glycocol may be replaced by asparagin, alanine, or sarcosin.) The solutions may be kept an indefinite time; they are mixed in equal proportions when required and a syringeful is injected. (The inner surface of the canula should be platinized.) A syringeful, or 16 minims, contains $\frac{1}{4}$ of a grain of mercuric oxide (International Medical Congress, Copenhagen).

Prof. Liebreich and afterward M. Zeissl administered soluble *formamide of mercury* (hydrargyrum formamidatum) subcutaneously. On the nature and preparation of this compound see "New Remedies," 1883, 281. This new compound is very

stable, does not coagulate albumen, and the mercury rapidly appears in the urine. Liebreich has obtained excellent results from its use in syphilis, injected in 8 to 16 minim doses of a one-per-cent solution. M. Carl Kopp has also used it in 126 cases (3,000 injections); he has abandoned its use in the severe forms of syphilis on account of its rapid elimination, but he believes that it can be advantageously used in the mild forms of syphilis. The relapses are frequent and it is better to administer mercurials internally, for example Lustgarten's oxytannate of mercury.

M. S. Rossa, after having administered the formamide of mercury to a considerable number of patients, concluded that this remedy produced no effect when administered internally, that given hypodermically it is extremely irritating, and, moreover, that its effects are inferior to those of other mercurials.

M. Lavolotski, of Moscow, has used mercurial preparations in 25 cases of syphilis without encountering any local troubles beyond slight pain; according to this author the formamide is preferable to the sublimate, their effects are similar and the local irritation which results is less in the case of the former.

The *glycocholate of mercury* is also used subcutaneously (Streitz); it is made by dissolving $1\frac{1}{4}$ grains of glycocholic acid in a few drops of distilled water, to which $\frac{1}{2}$ a grain of mercuric oxide is added. After filtration, distilled water is added to bring the solution up to 56 or 112 minims. Sixteen minims are equivalent to $\frac{1}{4}$ and $\frac{1}{14}$ grain of mercury respectively. [Glycocholic acid exists in the bile and is extracted therefrom by absolute alcohol. When boiled with alkalies, it splits up into glycocoll (or glycocine, or amidacetic acid), and cholic acid.—R.]

The formamide of mercury has been regularly used with benefit by the hypodermic method in the clinic of M. Neisser of Breslau in over 200 cases of syphilis. The injections, which are made into the gluteal muscles, are made slowly, and the portion injected is afterward subjected to systematic massage.

M. Bockhardt has recently introduced a new preparation. Blood serum of the horse, sheep, or ox is sterilized by Koch's method and filtered. Take 40 minims of serum and precipitate the albumen by a *hot* solution of 3 grains of sublimate in

30 minims of water This precipitate of mercury albuminate is next dissolved by a solution of sodium chloride (1 to 3), and, finally, sufficient water is added to bring the solution up to 210 minims. Ten minims of this solution contain $\frac{1}{7}$ grain of sublimate associated with albumen. It is neutral in reaction and keeps well if it is preserved in a dark vessel and in a cool place. The author has used it in 23 cases (505 injections); he makes one injection of 10 minims ($\frac{1}{7}$ grain of sublimate) every day or every second day. Three to five injections suffice to make exanthematous maculæ disappear; from 8 to 15 injections are necessary in the case of papular eruptions and of palmar psoriasis, from 8 to 12 for mucous gummata of the genital organs, anus, mouth, etc. The injections are not painful and should be made into the skin of the back, gluteals, and thigh; there never is any local reaction. Mercury can be detected in the urine 48 hours after treatment is inaugurated and for eleven weeks after the last injection.

The combination of *urea* with corrosive sublimate is, according to Schütz, an excellent preparation for hypodermic use. This compound is readily soluble in water, does not precipitate albumen and causes no pain or local effects. It is prepared as follows: dissolve 1 grain of sublimate in 100 minims of warm distilled water, add, when the solution is cool, $\frac{1}{2}$ a grain of chemically pure urea and make the solution up to 112 minims.

The commercial discs which contain $\frac{1}{16}$ grain of sublimate may also be used.

Mercury salts have been used hypodermically in the treatment of diphtheria (Hugo Schulz, 1883).

We purposely omit any reference to the parenchymatous hypodermic use of mercury in the treatment of carbuncle (Bienfait), elephantiasis Græcorum, etc. (Luton, Dominguez, Rigaud).

Various manufacturing firms make hypodermic tabloids, which are very convenient, containing $\frac{1}{60}$ and $\frac{1}{30}$ grain of corrosive sublimate respectively.

There are few subjects in regard to which there is greater contrariety of opinion than that of the utility of subcutaneous injections of mercury in syphilis. Although the subject is not a new one, so much has recently been published that it may be well to indicate generally the opinions which chiefly prevail

among the leading English and Continental syphilographers. In 1878 Dr. Buzzard published his experience of the use of mercurial peptone by hypodermic injection in a series of over 200 cases. The preparation he used was made from the meat peptone prepared by Messrs. Darby and Godson, of Leadenhall Street. "The conclusion arrived at by Dr. Buzzard is that it is safe with ordinary care as regards the formation of abscesses, and that the mercury is absorbed into the system. He believes it, however, to be a painful mode of treatment, even when the injection is made in the back and the solution employed is quite clear. He is disposed to think that it possesses no advantages over mercurial inunctions in cases of gummatous syphilis, or when there is evidence of internal disease, except perhaps the very problematical one of substituting a clean but painful process for one which is as dirty as it is free from personal suffering."

The opinion of Messrs. Hill and Cooper is, like that of Dr. Buzzard, unfavorable to the use of subcutaneous mercurial injections, except in rare and exceptional cases, although they do not appear to question the safety of this method. They recommend these injections only in cases where mercury fails to be absorbed after administration by ordinary methods, or in cases in which it is desirable to bring the patient rapidly under the influence of the drug, as, for instance, in severe affections of the eye, brain, and other internal organs. The bichloride, in minute doses administered twice in the twenty-four hours, is the salt to which these authorities give the preference; and they further recommend that the injections should be made into the flank, in preference to the arms and legs, pain being more likely to follow from injection into the latter regions. Bäumler, while admitting that subcutaneous injections of mercury made with due precautions, beyond the pain which they occasion, need give rise to no local troubles, except in unhealthy persons, yet thinks that the method is not so rapid in its effects as appears at first sight, the rapid disappearance of the external symptoms of syphilis being by no means equivalent to a cure of the disease itself. He also quotes the observation of M. Zeissl to the effect that there is more apt to be recurrence of syphilitic manifestations after hypodermic than any other form of medication. He recommends the back and sides of the thorax as the most appropri-

ate sites for injection. Later observers, among others Villar, Florez, and Schultz, speak highly in praise of antisyphilitic hypodermic injections. The two former authorities recommend injections of mercuric peptone and of cyanide of mercury, and they state that the latter salt is specially useful in cases of ocular, cerebral and medullary syphilis. They claim that hypodermic medication possesses the advantages over treatment by internal administration or by inunction, of being more exact in regard to dosage, in not giving rise to gastro-intestinal troubles, in shortening the duration of treatment, and in rarely causing ptyalism. Schultz uses a combination of mercuric chloride with urea.[30]

HYDRARGYRI CHLORIDUM MITE.

Mild Chloride of Mercury, Calomel.

Scarenzio, of Pavia, in 1864, then Ambrosoli, of Milan, and Sigmund, of Vienna, used hypodermic injections of calomel, by means of a finely levigated powder held in suspension in water or in glycerin, in various syphilitic affections. Messrs. Riccordi, Monte Forte, Casati (1867), Max von Mons, Soresina, of Milan, Bertarelli (1879), Padova, Magri, Appiani, Ragazzoni, Fiorari, Profetà, Watraszewski (1884), have also used calomel by injections in syphilis. Maximum dose, $\frac{3}{4}$ grain.

Calomel, ...	2 grains
Glycerin, ...	up to 16 minims.

(*Scarenzio.*)

M. G. Smirnoff treated syphilis successfully by hypodermic injections of calomel. This author employed solutions of one-half the strength of those employed by Scarenzio and others with the object of avoiding abscess.

Calomel, ...	3 grains
Distilled water,	
Glycerin, ...	of each 56 minims

Calomel, ...	$1\frac{1}{2}$ to 2 grains
Powdered gum arabic, . . .	1 grain
Distilled water, ...	up to 66 minims.

Eight to sixteen minims contain $\frac{3}{4}$ to $1\frac{1}{2}$ grains of the weaker preparation, and 1 to 2 grains of the stronger.

The results obtained in the treatment of syphilis were sat-

isfactory, but a small abscess frequently resulted at the point of puncture. A certain number of Italian physicians (Quaglino, Flarer, Magri, Gotti and Santini) used hypodermic injections of calomel in various ophthalmic affections of syphilitic origin. Messrs. Arigo, Formenti, Rossetti, Malvisi, subsequently used injections of calomel in pneumonia. According to Rossetti they should be made from the seventh to the tenth day in doses of ¾ grain to 2½ grains in mucilage.

M. Boni was much pleased with the results obtained by injections of calomel in croup; ¾ grain in the left arm of a child. ("Gazzetta med. Ital., provincie Venete," December 15th, 1883, p. 408.)

An important paper by Dr. Neisser on the value of calomel injections, published in the "Tageblatt der 58sten Naturforscher-Versammlung" in Strassburg, is quoted in the "London Medical Record" (Feb. 15th, 1886). Dr. Neisser recommends 4 to 6 injections, each containing 1½ grains of calomel prepared according to the subjoined formula:

Calomel,	
Sodium chloride, . . .	of each ʒ iv.
Mucilage of acacia, ...	ʒ ij.
Distilled water, ...	ʒ iss.

[It would be advisable to substitute mucilage of tragacanth for mucilage of acacia, as calomel is apt to cake with the latter and would thus be likely to choke the needle.—*Trans.*]

He concludes that injections of calomel, combined with mercurial inunction, constitute the most effective and energetic treatment of syphilis, and he is of opinion that this proceeding is the only one which insures the success of mercurial inunction. He thinks, from clinical experience, that the calomel method is most appropriate, and has proved most efficacious—(1) in the first treatment of syphilis; (2) in the treatment of serious relapses, both in their first and subsequent stages (iritis, squamous eruptions, etc.); (3) in the energetic curative methods which are to be repeated annually for 3 or 4 years. It appears that out of a total of 717 injections, there were 31 cases of abscess in 25 patients. Pain was, however, a more frequent occurrence, as was also stomatitis. In short, Dr. Neisser thinks that the advantages of the calomel method preponderate over its disadvantages.—*Trans.*]

HYDROQUINONUM.

Hydroquinon. Hydrochinon.

Hydrochinone is a benzol derivative, isomeric with pyrocatechin and resorcin. It is soluble in 18 parts of water, and easily in alcohol and ether; it is inodorous and has a sweetish taste.

Chief Physiological Effects.—Rapid fall of temperature, a dose of 3 grains producing an immediate fall of five-tenths. Doses of 6 to 9 grains produced this result with greater certainty and at the same time effected a diminution of the pulse. In doses of from 12 to 16 grains symptoms of excitement, resembling those produced by full doses of resorcin, were observed. These symptoms are transitory.

Its ready solubility and non-irritating character make hydroquinon suitable for hypodermic use, its injection never causing more pain than an injection of pure water.

Hydroquinon, ... 10½ grains
Distilled water, . . . up to 112 minims.
32 minims = 3 grains of the salt.

[As it requires 18 parts of water for solution, the proportions in the formula above given appear to be incorrect unless the injection is introduced warm.—R.]

After this injection a fall of 2° C. in the temperature, and of the pulse-rate by one-third, were observed, but these effects were very transient.

[In the article already quoted from the "British Medical Journal," it is stated that 3 grains of hydroquinon reduce the temperature very quickly without any unpleasant effects. The writer recommends that 5 to 10 minims of a 10-per-cent solution should be injected into each arm. An interesting paper by Dr. Seifert, of Dresden, in the "Berliner Klin. Wochensch.," 1884, No. 29, is quoted in the "London Medical Record," xii., 468. Dr. Seifert praises hydroquinon highly as an antipyretic, and says that no ill effects follow from repeated doses, so that fever may be kept down by it continuously and methodically. It has no disagreeable taste and is taken readily by children.—*Trans.*]

HYOSCINA.

Hyoscine and its Salts.[31]

[There has been considerable divergence of opinion as to the influence and mode of action of hyoscyamine, and it appears to be probable that many samples of so-called hyoscyamine have really owed their properties to the presence of unrecognized hyoscine. [This was pointed out in April, 1884 by the editors of the "American Druggist" (page 77). The so-called "Amorphous Sulphate of Hyoscyamine" which has a slight yellowish tint, consists largely of hyoscine, and is often used in place of the latter.—R.] To Ladenburg the merit is due of having been the first to isolate hyoscine and to describe its chemical and physical properties and its physiological action. As this drug is likely to take a foremost place among well-established hypnotics, and as only a passing notice has been taken of it as an anhydrotic by Drs. Bourneville and Bricon (which action, by the way, is questioned by Dr. Mitchell Bruce and other writers), it has been thought well to insert a notice of its properties and uses.

Hyoscine is a somewhat glutinous material and yields crystalline salts, the principal of these being the hydriodate, the hydrobromate, and the hydrochlorate. The experiments of Prof. Wood have been made with the two former, the hydrobromate being mostly used. [This is the preferable salt as it is in colorless, permanent crystals, and very soluble. The hydriodate is generally colored, and is much less soluble.—R.]

In frogs the symptoms produced were these: "An increasing sluggishness with a progressive loss of muscular movement, and a corresponding depression of the reflex activity; but without marked loss of sensibility. The respiration seemed to suffer *pari passu* with the general muscular power." When the dose administered did not produce lethal effects, there were no convulsive phenomena accompanying the restoration of muscular power, as is the case in frogs poisoned with atropine. Respiration failed before circulation, and even a strong solution of the alkaloid applied directly to the exposed heart exerted a slow and feeble depressing influence.

In the case of *mammals* hyoscine acts as a spinal depressant, and centric respiratory depressant, but it affects the

circulation slightly, and does not paralyze the pneumogastrics. In poisonous doses, although it paralyzes the vaso-motor system, it has very slight depressant influence on the heart. In the healthy human being the effects of a medicinal dose were as follows: In ten minutes after subcutaneous injection the symptoms resembled those of slight alcoholic intoxication, viz., sense of lightness and giddiness. These symptoms were succeeded by dryness of the mouth and throat, and restlessness in spite of the giddy sensations. Then followed drowsiness and profound sleep, on awakening from which there was no recollection. In one gentleman who accidentally took a small dose of a strong solution there were symptoms of weight of the eyelids, constrictive headache, chiefly frontal, sense of suffocation without dyspnœa, great uneasiness and unrest, with intervals of unconscious sleep. On recovery the after-effects were limited to slight headache and feeling of lassitude.

The *dose* ranges from $\frac{1}{200}$ to $\frac{1}{100}$ of a grain, and in some cases to as much as $\frac{1}{75}$ or $\frac{1}{50}$ of a grain. Dr. Mitchell Bruce has given as much as $\frac{1}{25}$ of a grain of the hydriodate without injurious effects, but as a general rule this dose is unsafe, and even with $\frac{1}{100}$ of a grain Dr. Nestor Tirard has observed, in a case of chronic Bright's disease, angry and combative delirium.

The drug is best administered hypodermically.

Hydrobromate of hyoscine, . . 1 grain
Distilled water, ... 200 minims.
One minim = $\frac{1}{200}$ grain.

M. Fräntzel has given the hydriodate of hyoscine in doses of from $\frac{1}{140}$ to $\frac{1}{48}$ grain and upward according to the following formula:

Hydriodate of hyoscine, . . . 1 grain
Distilled water, . up to 2 ounces 160 minims.
Eight minims = $\frac{1}{140}$ grain.

This author recommends hyoscine in cases where atropine has failed.

Therapeutics.—Dr. Wood regards hyoscine as being of little use for the relief of pain, but of great value in the treatment of spasm. It is contra-indicated in patients with a tendency to pulmonary œdema.

Hyoscine is of great service in the treatment of delirium,

excitement, and insomnia, alike in insanity and other diseases. It has been found useful in controlling the spasms of *hydrophobia*, although it failed to cure the disease, in the delirium of *pneumonia, cardiac and renal disease, epileptiform convulsions and chorea.* Prof. Edlefsen administered it in six cases of *whooping cough*, with advantage in three cases; in six cases of *asthma*, always with advantage, and in two cases of severe *enteralgia* with relief of pain. It has been extensively used by alienists with unmistakable benefit in cases of *acute dementia, mania, melancholia, hystero-epilepsy,* and other mental diseases.

As Dr. Mitchell Bruce points out, hyoscine is only a temporary remedy to quiet delirium and control excitement, and it does not cure the various diseases in the course of which delirium arises.—*Trans.*]

HYOSCYAMINA. TINCTURA HYOSCYAMI.

Hyoscyamine. Tincture of Hyoscyamus.

Hyoscyamine is an alkaloid obtained from hyoscyamus or from belladonna. It is crystallizable. Of its salts only the sulphate is obtained in definite crystals. [According to the most recent researches, belladonna contains no atropine at all, but only hyoscyamine. According to the method of extraction, the latter is altered more or less to atropine. Both alkaloids have the same ultimate composition, but are nevertheless different. Hyoscyamine also constitutes a variable portion of the alkaloid daturine (see *Daturina*). In fact, there is an intimate relationship between a number of solanaceous plants (belladonna, hyoscyamus, stramonium, duboisia), which appear to contain varying proportions of the same alkaloids—possibly only *one*—which, by different methods of extraction have heretofore been obtained as mixtures, or in an altered condition.—R.] The physiological phenomena produced by it are identical with those of daturine (see Daturina), nevertheless there is this difference between the two alkaloids, that the former causes no intermittence or arrest of the heart, nor convulsions. Oulmont and Laurent, who made these observations, used Merck's brown liquid hyoscyamine, of a syrupy consistence. [This is no longer in the market. It was of very indefinite composition.—R.]

It induces carbuncles and emaciation. Elimination is rapid and chiefly by the kidneys. It is partially *antagonized* by physostigmine (Amagat).

Local Effects.—Nil.

Dose, $\frac{1}{10}$ to $\frac{1}{4}$ grain (!) daily. M. Pitha reports that after a dose of $\frac{1}{12}$ grain, he observed almost at once extreme bodily enfeeblement.

Hyoscyamine, ...	1 grain
Distilled water,	to 560 minims or 1120 minims.

(*Eulenburg.*)

[Hyoscyamine being almost insoluble in water, the pure crystallized *sulphate* should be used.—R.]

In the treatment of night-sweats of phthisis, and in one case of profuse perspiration after a paroxysm of intermittent fever.

Therapeutic Uses. — Mercurial, saturnine, alcoholic and senile tremors (Oulmont, Eulenburg); obstinate chorea (Richter); mania (Mendel, Reinhard, Gray, Sepilli, Riva and Richter); epilepsy (Reinhard, Laurent, Sepilli and Riva); neuralgiæ, sciatica, Eulenburg (solution 1 in 500—from $\frac{1}{10}$ to $\frac{1}{6}$ grain), and Simonowitch, both without success; Verneuil used it with success after resection of the nerve had failed to afford relief. Laurent has used it in hydrophobia (Milan Commission, 1864); it has been used in the period of excitement in general paralysis, in locomotor ataxy and sclerosis (Lawson); lumbago (Laurent); paralysis agitans (one-per-cent solution, Bourneville).

[For further details of the therapeutics of hyoscyamine, see a paper by Mr. Engledue Prideaux, L.R.C.P. (published in the "Lancet," 1884), who has used the drug extensively. He has administered it, both by mouth and subcutaneously, in cases of mania with changeable delusions, with marked benefit, in monomania and pure melancholia, without much benefit, and with good results in mania of suspicion, even if accompanied by depression, and in ordinary epilepsy. Mr. Prideaux finds that in delirium tremens it lessens the delusions and cuts short the attacks. He adds "that in all cases of mental excitement, including acute mania, hysterical mania, and puerperal mania, it is the only reliable hypnotic that we have got." He uses Merck's amorphous extractive in doses of from $\frac{1}{16}$ to $\frac{1}{8}$ of a grain according to circumstances.—*Trans.*]—[This "amorphous extractive," as pointed out under *Hyoscina*, con-

tains a large proportion of hyoscine, and the effects obtained by Prideaux were no doubt largely due to this. It is impossible to base any conclusions on any of the older reports regarding hyoscyamine, owing to the uncertain composition of this. And even in the case of recent writers, unless they particularly specify the kind of "hyoscyamine" used by them, much doubt often remains as to whether true hyoscyamine or hyoscine has been the active agent.—R.]

HYPNONUM.

Hypnone.

[This new hypnotic, chemically belonging to the class of ketones, which was first observed and reported upon by Dr. Dujardin-Beaumetz, is also known under the name of acetophenone, and is prepared either by the action of benzoyl chloride on zinc-methyl, or by distilling together benzoate and acetate of calcium.

Some experimenters state that in the system this ketone undergoes a chemical transformation into benzoic and carbonic acids and is eliminated by the urine in the form of hippurate. Dr. Dujardin-Beaumetz says of it, "administered to adults in doses of 2 to 4 drops, which correspond to 5 to 15 centigrammes, hypnone induces sleep, and in cases of alcoholism it has appeared to yield better results than either chloral or paraldehyde."

"When injected subcutaneously in guinea pigs, in doses of 8 to 16 grains of the crude drug, hypnone induces a condition of torpor deepening into coma, and the animal succumbs after 5 or 6 hours. Hypnone is a fluid at the ordinary temperature and possesses a powerful odor resembling at the same time that of cherry-laurel and of fresh hay." It is insoluble in water, but is miscible with alcohol, ether, and glycerin.

Dr. Savage, who has used hypnone in several cases, has not found any ill effects follow from its administration; it appeared to be useful in cases of active melancholy, "and in one case at least it appeared to check an attack of recurrent mania." He does not consider that it is adapted for hypodermic purposes. It appears to resemble urethane in being a pure hypnotic, and consequently is not calculated to be of much service as a sedative where there is pain.—*Trans.*]

ICHTHYOL.

Ichthyol. Sulphichthyolic Acid and its Salts.

The name of *ichthyol* was at first applied to sulpho-ichthyolic acid[32] prepared by treating with sulphuric acid an oil obtained by distillation from fossil bituminous deposits found near Seelfeld in the Tyrol. Introduced by Unna in the treatment of skin diseases, the same author has recommended it for some internal ailments, amongst others for acute and chronic rheumatism. Although it is chiefly used as an external application, it has been also used hypodermically in 16-minim doses of a 5 to 10 per cent aqueous solution.

[Ichthyo-sulphuric or sulph-ichthyolic (or more correctly, ichthyo-sulphonic) acid is little used at present, but the salts obtained from it are much employed. The name *ichthyol*, by common consent of the manufacturers and the trade, is now applied to the ichthyo-sulphate of *ammonium* (ammonium sulph-ichthyolate, ammonium ichthyo-sulphonate). Salts of sodium, lithium and other bases are also prepared.—R.]

Dr. Unna has also recommended hypodermic injections of sulpho-ichthyolate of sodium (2 per cent aqueous solution) in the treatment of lupus.

[Ichthyol contains nearly 11 per cent of sulphur, and is a powerful antiphlogistic, rapidly producing anæmia of all the tissues to which it is applied. It must not be applied to abraded surfaces. Internally it is best administered by the mouth in doses of ʒ ss. to ʒ i. for adults, and 3 to 6 grains for children.[33]

Dr. Unna says that ichthyol is indicated internally: "(1) In skin diseases, acne rosacea, nervous forms of eczema in persons of nervous constitutions; eczema from teething; lichen urticatus; erythema multiforme; dermatitis herpetiformis; furunculosis—but it is *not* indicated in psoriasis. (2) In the following other diseases (I speak after five years' experience): in acute and chronic rheumatism; bronchial asthma; chronic catarrh of the stomach and intestines, together with catarrh of the bile duct (icterus); chlorosis, tuberculosis (especially in children), and scrofula; vascular engorgements of all kinds." It is a paratriptic, the body weight increasing under its use.[34] —*Trans.*]

INJECTIONES HYPODERMICÆ NUTRIENTES.
Nutritive Hypodermic Injections.

Since the physiological researches of Messrs. Menzel and Perco (1869) on the absorption of alimentary substances by the subcutaneous tissue, several attempts have been made in this direction. *Cod-liver oil*, which was experimented with by Messrs. Mosler and Pick, produced symptoms of local irritation.

Injections of fluid fat, of various oils, milk, etc., are incapable of causing fat embolism. The experiments of M. Flournoy ("Contribution à l'étude de l'embolie graisseuse," Paris-Strasbourg, 1878) have proved that they are innocuous in this respect. It is true that M. Riedel has discovered fat emboli in the lungs, consequent on injections into the abdominal cavity. Oil which has been injected, except when the injection is made into the peritoneal cavity, is only absorbed after the lapse of a very long time, at least in the case of rabbits. See also the physiological experiments of M. Eichhorn ("Wien. Med. Woch."). M. Albertoni (1873) injected milk serum into the veins of dogs. About the same time Hodder in Canada practised transfusion of milk in four cases of cholera, with three recoveries. M. Miglioranza ("Gazz. Med. It. Lomb.," May 6th, 1883) found as a result of experimental researches that it was a mistake to propose transfusion of milk for that of blood; that in the treatment of cholera, transfusion of serum by Abertoni's plan might be adopted, but not that of pure milk; that in anæmia lacteal transfusion could never replace blood transfusion; and, moreover, that these injections produced serious and even fatal results.

See in connection with the subject of intravenous injections of milk, gelatin, serum, and egg albumen, the treatise of M. Calmette, "Recherches expérimentales sur l'albuminurie produite par l'injection de substances organiques azotées dans le sang" ("Archives de physiologie," tome iii., 1870–71, p. 26).

Sweet almond and olive oil have also been administered as nutritive agents (see Oils).

Solution of *sugar* has been used by Krueg in a case of insanity where nourishment was refused. An entire *egg*, the white and yolk being mixed, has been injected by Krueg, with

subsequent abscess. Pick injected the *yolk*. Whittaker has injected with success in a case of gastric ulcer, milk and beef juice alternately (one fluidrachm every two hours). M. Luton made injections of milk (one and a half drachms each) and in four instances phlegmonous abscess resulted. We may add that Pick also practised injections of milk. Intravenous injections of milk have been made by Hodder, of Toronto (1850), and later by Gaillard Thomas, etc.; but they are apt to be productive of various accidents, amongst others fatty emboli (Culurq, 1879).

Dr. Edward Warren ("The Treatment of Typhoid Fever," 1876) recommends hypodermic injections of diluted milk, both as an aliment and as an antipyretic.

Milk has besides been injected into the veins; this method, which appears to have been used chiefly in America, has been recommended as a substitute for transfusion of blood, but this question does not fall within the scope of our inquiry. (See the cases of Dr. Thomas, of New York, who used from ten drachms up to eight ounces with success, and others.) M. A. Voisin, in melancholia, and M. Bernutz, in two cases of gastric ulcer, injected—the former, sheep's blood, and the latter, dog's and chicken's blood. Subcutaneous injections of defibrinated blood have been administered, both in cases of defective nutrition and as a substitute for transfusion, by various authors; among others by Messrs. Karst, Landenberger, Bumüller, Camerer, Schmeltz, Nicaise, Fless, Barreggi, Casse, and Langlet.

Barreggi uses for this purpose a Pravaz syringe with a capacity of one fluid drachm, or an apparatus for continuous pressure. The injections should be repeated every five or ten days, and should be of considerable amount, from 3 to 9 fluidounces. The defibrinated blood is prepared from blood taken from the jugular vein in the horse, dog, or man. The globules were absorbed without alteration (?), and the results were superior to those obtained from peritoneal transfusion. The blood was enriched both in globules and in hæmoglobin ("Arch. It. Med.," quotation from the "Imparziale," 20th August, 1883). Paladini on two occasions injected 4 fluidounces, in two doses, of human blood (case of acute anæmia) into the subcutaneous tissue by means of an ordinary syringe, fitted with an elastic tube uniting it to a fine trocar, which he moved about laterally

to separate the meshes of the connective tissue. With the exception of some ecchymosis there was no local trouble. Cure followed.[35]

Prof. Ziemssen has recently recommended a somewhat similar method. He injects into each thigh six drachms and twenty minims of defibrinated human blood, by means of a special syringe of the same capacity. Systematic massage of the blood tumor is then made. The injections caused only a trivial amount of pain and no local reaction. Ponfick, in 1879, recommended peritoneal injections of blood; since that time they have been practised by several other authors (Golgi and Raggi used them in anæmia with profound syncopal attacks). The attempt to utilize hæmoglobin solution at a temperature of 94° proved a failure in the hands of M. Bernatzik, in consequence of the severe local troubles which resulted. We may mention, in conclusion, injections of blood serum (Hüter), and of sodium chloride (Lubanski, see SODIUM; saline transfusions have been successfully practised by Messrs. Bischoff, of Bâle, and others); and lastly, of the peptones (see FERRUM).

IODUM. IODI TINCTURA.

IODINE. TINCTURE OF IODINE.

Hypodermic injections of iodized water (S. Cézard, Jaillot, Collot, Chipault, Verneuil, Davaine, Raimbert, Rémy, Labbé, and A. Richet), or of pure tincture of iodine (Boinet, Th. Anger, and Coulom; these authors have not observed either abscess or phlegmon as a result of injection), have been used in the treatment of malignant pustule, but the mode of action and the operative procedure class these injections among those with a localized effect.

IODOFORMUM.

IODOFORM.

Insoluble in water, soluble in alcohol (1 in 50), in ether (1 in 6), in fats, volatile and fixed oils, vaseline, chloroform, and carbon bisulphide.

Chief Physiological Effects.—Local and general anæsthesia, antisepsis, vomiting, nausea, epigastric pains, diarrhœa

(Maillard, dose 7 grains). According to some authors, iodoform acts like iodine. In dogs, doses of about 75 grains produced convulsions and death; fatty degeneration of liver, kidneys, and pancreas. Elimination is effected by the kidneys.

Local Effects.—Slight pain, redness and induration. Solutions in oil give rise to a more decided local action.

Dr. Bozzi, of Milan, was the first (in 1870) to make use of hypodermic injections of iodoform.

Iodoform, ... 3 grains
Ether, . . . up to 20 or 32 minims.
One to two syringefuls.
(*Neumann. Jouon, of Nantes.*)

The ethereal solution of iodoform has been used with success in severe cases of arthritis by Messrs. Mikulicz, Neumann, Müller, etc.

Iodoform, ... 1 grain
Almond or castor oil, . . up to 16 minims.

M. Neumann, rejecting Thomann's diluted solution (5 per cent), made use of saturated solutions.

Iodoform, ... 1 grain
Castor oil, ... up to 16 minims.

Iodoform, ... 5 grains
Ether, ... up to 32 minims.

Iodoform, ... 3 grains
Ether, ... 15 minims
Olive oil, ... up to 32 minims.
Sixteen minims = 1½ grains.

Iodoform, ... 2 grains
Castor oil, ... up to 16 minims.

Iodoform, ... 6 grains
Glycerin, ... up to 24 minims.

[Iodoform being practically insoluble in glycerin, only a mechanical mixture can be made of these ingredients.—R.]

From his researches Prof. Neumann believes not only in the absorption of iodoform when dissolved in ether, etc., but also in its absorption when held in suspension in glycerin. Dr. Mrazek ("Anzeiger d. Ges. d. Aerzte," No. 27, 1882) has also used iodoform suspended in glycerin; its presence was detected

in the urine, but the process of elimination was slow, at the rate of 1½ grains per diem, 1½ drachms of iodoform having been injected in thirteen days. Microscopical observations made by the author (post-mortem) showed that the glycerin injection was not innocuous, but gave rise to a local inflammatory process.

The solutions should be freshly prepared and kept in dark bottles. Emulsions of iodoform with distilled water and glycerin (equal parts) and mucilage have been employed in parenchymatous injections by Messrs. Delbastaille and Troisfontaines in the clinic of M. Van Winiwarter, and did not cause irritation; but such injections do not come within the scope of our subject. Iodoform has been injected hypodermically in syphilis by Messrs. Bozzi, Thomann and Lopp, and Neumann. Iodoform, which was introduced in 1836, has been chiefly used internally and externally in goître, scrofula, rickets, syphilis, phthisis, anal fissure, prostatic enlargements, neuralgia (Dr. Moretin, 1853), uterine and mammary carcinoma (Demarquay), serous collections, chronic arthritis, glandular enlargements (Gubler), cancerous and venereal ulcers, to stimulate sluggish wounds, in varicose and phagedænic ulcers, rupia and ecthyma, inter-digital mucous gummata, suppurating buboes, moist gangrene, gunshot wounds (Féréol), chronic venereal ulcer (D'Amico), intermittent fevers (Knotts), toothache due to caries (Lailler, Marrotte, etc.). The use of iodoform has been revived at various times, among others in Paris in 1873, finally, it has been brought into use anew in the treatment of wounds and various surgical affections.

KAIRINA.

Kairine.

A derivative of quinoline, discovered in 1882 by O. Fischer. We understand by this name the hydrochlorate of oxy-ethyl-quinoline. [The name kairine was applied by O. Fischer to two synthetically prepared bases, derived from quinoline, one containing the *ethyl* and the other the *methyl* group. The former was at first designated by *kairine A* (the A standing for æthyl), and the second by *kairine M.* Subsequently, the ethyl kairine (kairine A) was exclusively used, and called simple *kairine.* — R.] Kairine hydrochlorate exists in the

form of a white, or whitish, crystalline powder, soluble in 6 parts of water and in 20 parts of alcohol, slightly soluble in glycerin, and insoluble in ether. It has a saline bitter taste.

Principal Physiological Effects.—Is an antiputrescent, slows the pulse and respirations, lowers arterial tension, and diminishes temperature by vaso-motor dilatation. There is diminution of general sensibility and motility in proportion to the amount of the dose; convulsions, contractures, pupillary contraction and paresis occur only after large doses. Profuse sweats coincide with fall of temperature and rigors with its rise; there may be cyanosis, hæmaturia, and diminished excretion of urea. The respiratory capacity of the blood is diminished (Picot, Brouardel, P. Loye, Conscience), reduction of hæmoglobin to methæmoglobin (Morohowetz, of Moscow, and Galoubof). *Elimination* is effected by the kidneys with dark-green discoloration of the urine.

Therapeutic Uses.—Kairine, although used in a great variety of affections by various authors (Filehne, Guttmann, etc.), has been almost exclusively used internally. M. Queirolo has, however, used kairine hypodermically in doses of 1½ to 8 grains in 16 minims of water. These injections did not give rise either to local or general ill-effects. The same author states that at the ordinary temperature kairine will only dissolve to the extent of 1½ grains in 16 minims of water. Stronger solutions can be prepared by gradually raising the temperature of the water, which will remain clear at a temperature of 95° F. Deep injection is necessary. Kairine has been mostly used as an antipyretic, but the unpleasant effects, such as profuse perspiration and rigors, to which it gives rise, and the very temporary influence it exerts on the temperature render it less useful as an antipyretic than antipyrine. In conclusion, it is contra-indicated in cardiac and pulmonary diseases, anæmia, and those ailments which are characterized by diminished hæmatosis and impoverishment of the blood. (Picot and Conscience.)

LITHII BROMIDUM.

Bromide of Lithium.

M. Lévy has experimented on himself with lithium bromide, in doses of ab. ¼ of a grain, but "although no local inconveni-

ence was occasioned, this mode of administration appeared to him to be useless and dangerous." Dr. Weir Mitchell has seen slight suppuration after injection of this salt.

MAGNESII CHLORIDUM.

Chloride of Magnesium.

M. Luton says he has accidentally used chloride of magnesium, produced by double decomposition by the action of morphine hydrochlorate dissolved in cherry-laurel water, the excess of acid being neutralized by the magnesia. "The contact of such a fluid with the tissues is scarcely perceived, it excites no irritation, and, what is more, it plays the part of a laxative. This effect very soon passes off, but it is incontestably manifested in some individuals. [Dr. Hay remarks on this subject —"saline purgatives do not act when injected subcutaneously; or, if they do, it is only when they are injected over the abdomen, and in virtue of a reflex effect." Von Ziemssen's "Handbook of General Therapeutics," vol. ii., 481.—*Trans.*]

MAGNESII SULPHAS.

Sulphate of Magnesium.

M. Luton has used sulphate of magnesium (1½ grains in 16 minims of distilled water) by the hypodermic method, and the purgative effect was produced. "This solution," he remarks, "is not irritating as has been asserted, or, at least, it does not cause more pain than pure water does."

M. Betz has used it and found it irritating. Gubler has used subcutaneous injection of sulphate of magnesium unsuccessfully (3 grains in 16 minims). Armaingaud (1877) injected it successfully.

MORPHINA.

Morphine and its Salts.

Morphine is almost entirely insoluble in water, sparingly soluble in alcohol, ether, chloroform, and glycerin, and insoluble in essential oils.

The *hydrochlorate* is soluble in 24 parts of water, in 50 parts of alcohol, and in 20 parts of glycerin.

Sulphate of morphine is soluble in 24 parts of water, and in 5 parts of glycerin. It contains 75.2 per cent of the alkaloid. The *acetate*, when freshly prepared, is soluble in 12 parts of water, but it is somewhat unstable; it contains 71 per cent of alkaloid. The *tartrate* is very soluble in water and alcohol; according to Stuart, who has recommended it for hypodermic use, it does not irritate the cellular tissue and is stable in aqueous solution. The *meconate* is almost gone out of use. [Recently, the *phthalate* has been recommended by Bombelon. This salt is soluble in 4 parts of water, forming a stable solution.—R.]

Principal Physiological Effects.—In *medicinal doses.*—In small doses, and even when the dose is considerable, the period of prostration is preceded by a stage of excitement, which, however, is very short in the latter case. Insomnia, excitement, and hallucination; increase of blood pressure and temperature, and increased rate of cardiac pulsations also result from these doses. Somnolence, muscular enfeeblement, sensorial troubles, contraction of the pupils, mental torpor, diminution of sensibility, and of muscular contractility, co-existing with increase of reflex excitability (the spinal cord is influenced by the morphine after the brain), dryness of the mouth and throat, with thirst, impairment of appetite and of gastric digestion, constipation, nausea, and vomiting, more or less profuse perspiration, itchings, excitement and alarm on awaking.

In larger doses[36] there are sluggishness of thought and of movement, succeeded by comatose sleep; the pulse is either slow or of unwonted frequency, respiration becomes irregular and sometimes falls in number to eight or ten per minute; the mucous membranes become cyanosed, the countenance is pallid and covered with violet colored patches. The temperature falls and death finally supervenes, frequently amidst clonic and tonic spasms. The local action of morphine hypodermically injected, although it appears to be tolerably certain, is still a matter of controversy.

Opium has a much more decidedly stimulating effect than morphine on the cardio-vascular apparatus; it raises the pulse, at the same time increasing the amplitude of the pulse wave, and it stimulates also in the most marked way the calorific function. The hypnotic phenomena produced by opium may be explained, according to many authorities, by a condition of

static congestion of the cerebral substance and the meninges; hence it has been proposed to utilize it and its derivatives to counteract the cerebral anæmia resulting from aortic insufficiency and other affections.

Morphinism.[37]—Dryness of the mouth, thirst, nausea, vomiting, generally constipation, occasionally dyspnœa and palpitation (a combination rare and unusual), albuminuria, loss of power, amenorrhœa, insomnia with hallucinations, varying disposition, hyperæsthesia, neuralgia, tremor of hands, bewildered and stupid expression; various forms of eruptions, loss of appetite, tendency to suppurations, emaciation. These phenomena are more pronounced after the sudden abandonment of the morphine habit. M. Luton, following the practice adopted by certain physicians and hospitals in New York, is in favor of the sudden cessation of morphine injections; in addition to an appropriate hygiene, he recommends nux vomica preparations and derivatives, as a remedy for morphinism as well as of alcoholism. (See also Bourneville and Regnard, "Icon. phot. de la Salpêtrière," tome iii., p. 93.)

The combined action of *morphine* and *chloroform* was observed almost simultaneously by Neumann and H. Bernard. Morphine administered before chloroform induces profound muscular relaxation; given afterward, it prolongs the chloroform anæsthesia. Numerous surgeons have used it with benefit in combination with atropine before anæsthetizing. (See Atropina.)

The subjoined table shows readily the relative position as hypnotics, convulsants, and toxic agents of the various alkaloids of opium.

Hypnotic Action.—(1) Narceine. M. Fronmüller and some other authors attribute only the slightest hypnotic effects to it. In man according to Rabuteau, it is less of a soporific than morphine. (2) Morphine, (3) Codeine. M. Rabuteau, in opposition to the opinion expressed by M. Bouchut, regards this as soporific and analgesic to a very trifling extent; in man it does not appear to be poisonous except in doses above $2\frac{1}{4}$ grains.

Tetanic Action.—(1) Thebaine; (2) Papaverine; (3) Narcotine; (4) Codeine; (5) Morphine; (6) Narceine.

Poisonous Action.—(1) Thebaine; (2) Codeine; (3) Papaverine; (4) Narceine; (5) Morphine; (6) Narcotine.

Man is of all animals most sensitive to the action of morphine, and hence it is necessary to be on one's guard, more perhaps than in the case of any other drug, against the error of judging the effects likely to arise in him from those which are manifested in the lower animals. Besides, in man and the lower animals, alike, the effects vary with age, constitution, etc. Children, for instance, are extremely susceptible to the influence of morphine. The lethal dose in individuals who are not habituated to its use varies within very wide limits; hence it is wise to begin with very minute doses ($\frac{1}{60}$ grain for example), and to increase them cautiously. Morphine is *eliminated* with considerable rapidity by the kidneys. As regards the question of *antagonism* between opium and its salts on the one hand and atropine and daturine on the other, it is very open to question. The *local effects* are *nil* when the injection is skilfully effected.

Rynd was the first who administered morphine subcutaneously (with creosote as a vehicle), and he was followed by Wood, Béhier, etc. Solutions of morphine hydrochlorate become turbid very quickly, and become possessed of irritant properties. To obviate this difficulty cherry-laurel water has been proposed as a vehicle, as have also water distilled from eucalyptus globulus (Gubler), peppermint and cinnamon water (Delioux and Savignac), glycerin, alcohol, alcohol and water (Adrian and C. Paul), distilled elm water (Patrouillard), chloral (Vidal), a solution of salicylic acid, 1 in 2,000 (Limousin, Keyes, etc.), carbolic acid, etc. [The best preservative, in the case of hypodermic solutions of alkaloids, and especially of morphine salts, is chloroform water, prepared by saturating distilled water with chloroform by shaking. One grain of chloroform will dissolve in about 200 grains of water.—R.]

We always think it desirable, whatever vehicle may be selected, to use a one or even a half per cent solution. The solution may besides be freshly prepared, as required, with advantage.

Hydrochlorate of morphine, .	$\frac{1}{2}$ to 1 grain
Distilled water, .	up to 112 or 224 minims.
Sixteen minims represent $\frac{1}{14}$ to $\frac{1}{7}$ grain.	
Hydrochlorate of morphine, . .	2 grains
Chloral, ...	4 grains
Distilled water, . .	up to 112 minims.

M. Vidal finding that this solution caused pain reduced the proportion of chloral to $\frac{1}{2}$ grain.

Hydrochlorate of morphine, . . 1 grain
Cherry-laurel water, . . up to 56 minims.

Eight minims contain $\frac{1}{4}$ grain.

Messrs. Savory and Moore's discs contain $\frac{1}{4}$ grain of morphine; they are perfectly soluble in a few drops of warm water. Numerous authors have pointed out the happy effects of combining morphine with atropine. (See ATROPINA.)

Hydrochlorate of morphine, . . 1 grain
Sulphate of atropine, . . . $\frac{1}{10}$ grain
Cherry-laurel water, . . up to 224 minims.

Sixteen minims of this solution contain $\frac{1}{14}$ of a grain of morphine, and $\frac{1}{14\,0}$ of a grain of atropine.

Acetate of morphine, . . . 12 grains
Acetic acid, ... 1 minim
Glycerin, ... 5 minims
Distilled water, ... up to 36 minims.

(*Nider.*)

[This formula appears to be erroneous, as Messrs. Bourneville and Bricon observe, and should be stated as follows:—

Acetate of morphine, . . . 12 grains
Acetic acid, ... 1 minim
Glycerin, ... 5 minims
Water, ... up to 240 minims.

This solution contains 1 grain, instead of 6.9 grains, in 20 minims.—*Trans.*]

Hydrochlorate of morphine, . 1 grain
Spirit of peppermint, . . . 10 minims
Peppermint water, . . up to 112 minims.

(*Delioux and Savignac.*)

Sulphate of morphine, . . 256 grains
Salicylic acid, ... 8 grains
Distilled water, ... 16 fl. ounces.

Heat the water to the boiling point, dissolve the morphine and salicylic acid in it and filter.

(*Keyes*, 1879.)

Sulphate of morphine, . . . 16 grains
Distilled water, . . . up to 480 minims.

Dissolve and filter.

(*Bartholow.*)

Sulphate of morphine,	16 grains
Sulphate of atropine,	$\frac{1}{3}$ grain
Glycerin,	1 drachm
Carbolic acid,	6 grains
Distilled water,	7 drachms.

Dissolve and filter. 1 grain of morphine and $\frac{1}{48}$ grain of atropine in 30 minims. (*Sledge.*)

White oxide of antimony,	10 grains
Morphine hydrochlorate,	2 grains
Cherry-laurel water,	up to 112 minims.

Eight minims contain $\frac{1}{4}$ of a grain of morphine. To allay cough. (*Navarret.*)

[White oxide of antimony is entirely insoluble in water, and if suspended in the liquid, is very apt to clog the canula of the syringe. It is doubtful whether this mixture was ever really used hypodermically.—R.]

Sulphate of morphine,	10 grains
Distilled water,	q. s.
Diluted sulphuric acid,	1 minim
Carbolic acid,	2 grains
Glycerin,	60 minims.

Filter. (*Ainsworth.*)

[There is no need of adding an acid to promote solution in the case of sulphate of morphine.—R.]

Dissolve the morphine in 180 minims of water with the diluted sulphuric acid by the aid of a gentle heat; then add the carbolic acid dissolved in the glycerin. Filter and add water up to 300 minims. Five minims contain $\frac{1}{6}$ of a grain of morphine. The injection should be made intramuscularly. This solution frequently causes suppuration.

M. Rusconi has combined cocaine and morphine:

Hydrochlorate of cocaine,	$1\frac{1}{2}$ to 3 grains
Hydrochlorate of morphine,	1 grain
Distilled water,	up to 224 minims.

Sixteen minims contain $\frac{1}{14}$ of a grain of the morphine and $\frac{1}{10}$ to $\frac{1}{5}$ of a grain of the cocaine salt.

The use of morphine has become so extensive and universal that it is administered nowadays in all sorts of ailments,

rightly and wrongly. We do not deem it necessary to dwell at greater length on the physiology and therapeutics of morphine and its salts, as they are so well known to, and in such general use by all practitioners. We may refer for further details of the hypodermic uses of this alkaloid to the monograph by Dr. Kane, of New York, "The Hypodermic Injection of Morphia, its History, Advantages, and Dangers," New York, 1880. We may further refer to the essay by M. A. Dennis, of Strasbourg (1868), which contains a well-constructed table of the diseases treated by morphine injections, with the names of the authors who have used them. This table, which is now out of date, consists of no fewer than six quarto pages. It is impossible to protest too strongly against this abuse, as morphine and its salts should never be prescribed except in well-defined cases. Morphine injections have frequently been used in the treatment of cholera. M. A. Renault, and more especially M. Huchard, have recommended the use of morphine in all forms of dyspnœa without any reference to their cause. Dr. Walter Coles, of St. Louis, recommended them in 1883; mophine before the period of collapse, combined with atropine in the intermediate stage, and atropine alone in the stage of collapse. Morphine and narceine alone of all the alkaloids of opium are anexosmotic; the former is specially serviceable in hypodermic injections (Béhier, C. Codrescu (1866), Vulpian, Legagneur (1876), etc.

[The Injectio Morphinæ Hypodermica of the British Pharmacopœia (1885) is a solution of the acetate; ten minims = 1 grain of the acetate, and the dose is 1 to 6 minims.

Martindale and Westcott give a formula for a solution of the acetate having a strength of 1 in 6. They also give a formula for a solution of the acetate in combination with sulphate of atropine, 3 minims of which contain $\frac{1}{2}$ a grain of acetate of morphine and $\frac{1}{60}$ of a grain of sulphate of atropine. I have now for some time used Burroughs and Welcome's tabloids, which yield excellent results and are convenient in many ways.

The bimeconate of morphine was recommended by the late Mr. Squire ("Companion to the Pharmacopœia," 13th edit., p. 228). It is one of the least irritating solutions for hypodermic purposes, but has the disadvantage of readily becoming turbid. The tartrate of morphine is excellently adapted for

hypodermic use and is not so apt to corrode the needle as some other preparations. Like the bimeconate, it has the further advantage of not being apt to produce headache, nausea, or constipation.

[See remarks on page 452 on phthalate of morphine, which appears to have still greater advantages.—R.]

Among the many diseases in which morphine has been used subcutaneously, *diabetes* should be mentioned. The value of opium in the treatment of this disease has been known for a long time, and its employment hypodermically has been advocated for many years; but Dr. Mitchell Bruce has recently conducted some important clinical investigations which seem to prove that morphine may be used hypodermically in diabetes for diagnostic purposes—*i.e.,* to ascertain the particular form of the disease and the source from which the sugar is derived.

Dr. Bruce treated a case of glycosuria (1) on ordinary diet, (2) on strict Pavy diet, (3) on Pavy diet with the administration of morphine by the mouth, and (4) on Pavy diet combined with the subcutaneous administration of morphine. During the continuance of these experiments daily observations were made as to the amount of sugar excreted, and Dr. Bruce arrived at the following conclusions:

I. *Therapeutical.*—That morphine was of signal value in the treatment of diabetes.

II. *Physiological and Pathological.*—1. That in the particular case reported on, the glycosuria was proved to be due to an increased income of sugar into the blood, not to diminished destruction of sugar in the system.

2. That in the same case the increased income of sugar was proved not to originate in simple transportation of sugar from the intestine or portal vein to the general circulation.

3. The excessive glycogenesis in this case was proved to be effected mainly or entirely in the liver, not in the muscles or any of the other viscera.

4. The seat of the disordered process, whatever may have originated it, was shown to be in the liver, and not in the central nervous system or nerve trunks.

The importance of these observations and their direct bearing upon the subject of hypodermic medication are so obvious that no apology is, perhaps, required for quoting them at such length.—*Trans.*]

MOSCHUS—TINCTURA MOSCHI.

Musk, Tincture of Musk.

M. Rosenthal praises musk highly as a diffusible stimulant in the algid stage of cholera and in adynamic forms of typhoid fever. M. Rohde used an aqueous infusion (1 in 40), of which he injected from 16 to 48 minims *per diem*, according to the gravity of the case. In most of the cases a rise of pulse-rate and of temperature resulted.

Locally he observed on one occasion a slight slough of the skin in a case of cholera, and in another instance there was induration without abscess. M. Drasche obtained only negative results in the treatment of cholera. Musk and its tincture have lately been used by various writers, among others by Vogelsang, in the treatment of infantile convulsions. Tincture of musk is injected in doses of 8 to 32 minims. [This refers to the tincture of the German Pharmacopœia which is made with one part of musk and twenty-five parts each of water and alcohol. The French tincture is much stronger: the tincture of the *Codex* is composed of ten parts of musk to one hundred parts, by weight, of alcohol. The tincture of the U. S. Pharm. (1880) is also 10 per cent.] The practical value of musk is open to question, inasmuch as it is very costly, and its place is easily supplied by other stimulants.

MUSCARINA.

Muscarine.

Muscarine, an alkaloid extracted from the poisonous fly agaric, *Amanita muscaria* Persoon, has been used hypodermically only by Ringer and Morshead, who gave it in doses of $\frac{1}{3}$ to $\frac{3}{4}$ of a grain. [For full details of Dr. Ringer's investigations see his "Handbook of Therapeutics," 12th edit., p. 368. He states that the action of muscarine is identical in men and in animals, that it contracts the pupil, excites profuse perspiration, free salivation, and running at the nose and eyes; it purges, occasionally causes nausea and vomiting, and excites a strong desire to urinate. Its properties are closely analogous to those of pilocarpine. It has been used with success in the night sweats of phthisis, and it as also been administered to

arrest the secretion of milk. See also the "Transactions of the Medical Congress," 1881, vol. i., p. 508.—*Trans.*] M. Prévost has suggested that it might be possible to antagonize the poisonous symptoms due to atropine by hypodermic injections of muscarine, physostigmine, or pilocarpine in moderate doses. We may add that M. Prévost's experiments prove a mutual antagonism between muscarine and atropine.

NAPELLINA.

Napelline.

Napelline which has been investigated by Messrs. Hübschmann and Groves, who gave it its name, is contained in the mother-liquors of crystallized aconitine. It has been extracted by Duquesnel, is an amorphous alkaloid of aconite, is soluble in water, ether, alcohol, and to a slighter degree in chloroform. [It is very probable that napelline is a product, caused by some alteration of original aconitine during the process of preparation. It is by some believed to be identical with aconine, a decomposition product of aconitine.—R.]

"The great solubility of our napelline," observe Messrs. Duquesnel and Laborde, "has permitted our preparing a very clear solution, eminently suitable for subcutaneous injections." From their experiments they conclude that the effects of their napelline demonstrate: (1) that the phenomena by which it manifests its action are, in reality, fundamentally identical with those which are characteristic of the physiological action of crystallized aconitine. (In addition to a calmative and analgesic action, however, it is also soporific); (2) that the intensity of this effect is incomparably less than that of crystallized aconitine. From a dose of 16 grains, administered to a dog, Messrs. Duquesnel and Laborde obtained lethal toxic effects without emesis.

Napelline, ...	1 grain
Distilled water, ...	up to 112 minims.

Sixteen to sixty-four minims = $\frac{1}{7}$ to $\frac{4}{7}$ of a grain of the active substance.

Calmative and soporific effects were produced by doses of $\frac{1}{7}$ to $\frac{4}{7}$ grain, which were not succeeded on awaking by any sensation of illness (malaise).

M. J. Voisin has injected it hypodermically in several cases of epilepsy. His formula is:

Napelline, ...	1 grain
Alcohol (90%), ...	48 minims
Distilled water, . . .	up to 112 minims.

Napelline has been used in the clinic of M. Dumontpallier in facial neuraglia, in a hysterical patient, in neuralgic lumbago, and sciatica, in rheumatoid pains, and fugitive neuralgiæ, in doses of $\frac{1}{4}$ to $\frac{3}{4}$ of a grain in a 1 in 20 solution. We are of opinion that further experiments must be made before admitting this so-called alkaloid into our list of therapeutic agents. It is with this substance as with many others, we have not deemed it right to pass it over in silence; but such agents can only be accepted after extended investigation. [It might be well to experiment rather with the secondary alkaloid *aconine* mentioned in a preceding note. This is at least a perfectly definite chemical substance, while *napelline* has not yet been shown to be such.—R.]

NARCEINÆ HYDROCHLORAS.

Narceine Hydrochlorate.

Narceine is almost insoluble in water, is insoluble in ether, but readily soluble in alcohol.

The *hydrochlorate* dissolves readily in water, splitting at the same time up into a basic salt and free acid, but the sulphate is but little soluble in this vehicle.

Dose.—One and a half to three or even to six grains.

Narceine hydrochlorate, . . .	2 grains
Distilled water, . . .	up to 224 minims.

Dose.—Six, eight, twelve, or even as much as sixteen minims $\frac{1}{18}$, $\frac{1}{14}$, $\frac{1}{9}$ and $\frac{1}{4}$ of a grain respectively. ("Pharmacopœia of Vienna Hospitals.")

M. Rabuteau (1883) recommends injections of narceine hydrochlorate to obtain complete narcosis from small doses of chloroform. According to this writer, thebaine, and papaverine also, to a certain extent, promote chloroform narcosis.

Messrs. Béhier, Linné (1865), Erlenmeyer, May Figueira, Reissner, Piedvache, Oettinger, Petrini, Eulenburg, Fronmüller, Harpprecht, Lubanski and others have administered hy-

podermically both narceine ($\frac{2}{3}$ of a grain in 16 minims) and its hydrochlorate. A solution of narceine cannot be used cold, and its injection is sometimes attended with pain, as it is necessary to acidulate the solution.

M. Lubanski has suggested a combination of morphine and narceine injections in the subjoined formula:

Hydrochlorate of morphine, . .	1 grain
Distilled water, . . .	up to 24 minims.

To this may be added $1\frac{1}{2}$ to 3 minims of a ten-per-cent solution of narceine. ["The advantage of this is very doubtful." Eulenburg in Ziemssen's "Handbook of General Therapeutics," Dr. Hay's translation.—*Trans.*] Such a solution is as questionable in regard to composition as it is in regard to utility. If it is made use of at all, the solution should be made with hydrochlorate of narceine on account of its solubility.

NARCOTINA.

Narcotine.

Narcotine is insoluble in water and alkaline solutions, but soluble in 100 parts of alcohol, 33 parts of ether, and 3 parts of chloroform. *In small doses* it produces narcotic and soporific effects, and *in large doses* twitchings, convulsions, and, at last, general paralysis and death. It takes a larger dose of narcotine than of morphine to produce soporific effects. Writers are not agreed as to the dose which may be given, and there is a similar disagreement in regard to its physiological action;—thus M. Rabuteau denies that it has any analgesic or soporific action. This alkaloid has been administered hypodermically by Prof. Eulenburg [who says that both thebaine and narcotine are quite worthless for hypodermic as they are for any therapeutic use. — Loc. cit., p. 457.—*Trans.*] Injections occasion severe smarting, which, however, rapidly disappears.

NICOTINA.

Nicotine.

Nicotine, never previously used therapeutically, was employed hypodermically by Erlenmeyer in a case of tetanus,

without local trouble and with good results, in doses of $\frac{1}{10}$ of a grain.

Nicotine, ... 1 grain
Distilled water, . . . up to 280 minims.
Four minims = $\frac{1}{10}$ of a grain.

NITROGLYCERINUM. GLONOINUM.

Nitroglycerine or Glonoin.

Nitroglycerin or glonoin, which was discovered by Sobrero in 1847, is a nitric ether of glycerin; in its pure state, it is an inodorous, yellowish oil and has a mawkish taste; it is slightly soluble in water, but dissolves readily in alcohol and ether.

Principal Physiological Effects in Man.—Nitroglycerin is a powerful poison.

In moderate doses, 1 to 10 drops of a 1 per cent solution, it produces a feeling of intracranial fulness, more or less severe headache, confusion or sluggishness of thought, tinnitus aurium, vertigo, amblyopia, quickening of pulse rate with occasional dicrotism, diminution of arterial pressure, redness and flushing of the face, sweats, nausea, vomiting, and occasionally exaggeration of the respiratory movements.

In Poisonous Doses (exceeding ten drops) clonic and tonic convulsions and death from asphyxia. The effects of glonoin closely resemble those of amyl nitrite, but are more persistent. Most investigators have obtained merely negative results in animals. Indeed the effects of glonoin vary widely with the species of animal, its age, etc.; moreover, the physiological properties have long been a matter of uncertainty and dispute.

Messrs. Dujardin-Beaumetz and Marieux have injected $1\frac{1}{2}$ to 3 minims of a 1-per-cent solution of nitroglycerin mixed with water up to 16 minims.

Alcoholic solution of nitroglycerin
(1 per cent), ... 25 minims
Cherry-laurel water, . . up to 160 minims.
(*Marieux and Dujardin-Beaumetz.*)

Sixteen minims = $2\frac{1}{2}$ minims of solution of nitroglycerin.

[The above-mentioned alcoholic solution contains 1 per cent

by weight of nitroglycerin. As alcohol has a low (0.820), and glonoin a high specific gravity (1.600), the relation by *volume* in this 1 per cent solution differs greatly from that by weight. One minim of the 1-per-cent solution (made by weight) contains about $\frac{1}{194}$ minim of pure glonoin. On Solution of Nitroglycerin see the "National Formulary," under No. 341.—R.]

The effects are produced in from 5 to 10 minutes after injection. The dose should commence with two minims and should never exceed six minims in the twenty-four hours. By taking the precaution to make the injections into the muscles of the back or of the gluteal regions, these authors have never observed local accidents—such as pain or abscess.

Therapeutic Uses.—Nitroglycerin has been administered internally by Field ("Medical Times and Gazette," 1858) for neuralgia, epilepsy, and hysteria. Thorowgood and James, Laurence of Brighton, Baker Edwards, S. Brady (1859) and others have administered and recommended it. In consequence of the experiments of Fuller, Harley, and Vulpian (1859), who disputed the results obtained by the above-mentioned authors, glonoin fell into disrepute for several years, but after the publication of M. Bruel's essay, glonoin was again used by Murrell (1879), Mayo-Robson, Craig, Farquhar, Stilts, McCall Anderson, Green, Hammond, Steward, Korcinski, Huchard, Trusevich, and Bramwell, in angina pectoris, acute and chronic nephritis, epilepsy, eclampsia, asthma, palpitation, affections of the heart and aorta, syncope, migraine, neuralgia, vertigo, Menière's disease, and epileptiform tic.

In regard to some of these ailments, the results obtained are contradictory. Glonoin appears to be mostly of use in angina pectoris and in all diseases in which cerebral anæmia is a leading symptom. Quite recently M. Rossbach has recommended its use in the treatment of interstitial nephritis.

[The following formula is borrowed from the "Extra Pharmacopœia" of Messrs. Martindale and Westcott:

Solution of nitroglycerin, 1 per cent,	5 drachms
Alcohol, ...	2 drachms
Distilled water, . . .	up to $1\frac{1}{2}$ ounces.

Dose 1 to 4 minims. One minim contains $\frac{1}{240}$ of a grain.

A very convenient mode of administration is by means of troches, tablets or pills [see "Nat. Formulary," No. 296—R.].

In addition to the diseases mentioned by the authors, nitroglycerin has been used with marked benefit in the treatment of sea-sickness, the vascular tension which occurs in the aged, myxœdema and puerperal convulsions.—*Trans.*]

OLEANDRINA.

Oleandrine.

This alkaloid, extracted from rose laurel (*Nerium Oleander*, belonging to the cardiac poisons) has been administered subcutaneously only by Erlenmeyer, but without success, in epilepsy.

Oleandrine, ...	10 grains
Alcohol, ...	q. s.
Distilled water, . . .	up to 120 minims.

12 minims = 1 grain.

[Oleandrine, an alkaloid discovered by Lukomsky, is to be distinguished from oleandrin, a glucoside, isolated by Schmiedeberg. As it is impossible to ascertain which of these bodies has been used by Erlenmeyer, no reliance can be placed upon any results reported by him, even if they had been positive.—R.]

OLEUM AMYGDALÆ EXPRESSUM.

Expressed Oil of Almonds.

According to M. Binz this oil has been used subcutaneously as a nutrient injection, but without success on account of the difficult absorption of oils by the cellular tissue (see *Injectiones Nutrientes*).

[Dr. Shoemaker, of Philadelphia, has used oil subcutaneously in numerous cases with most encouraging results. He has obtained the purgative effects of castor oil after hypodermic administration, and he has injected one to four drachms of cod-liver or olive oil in cases of debility, dyspepsia, scrofula, and in cutaneous and nervous diseases. In diseases of the alimentary canal and in all forms of defective nutrition this method of treatment has been eminently successful. As in most other cases of hypodermic medication, no evil results ensue from the practice, and beyond trifling and transient

pain, and perhaps a little local redness and swelling, no inconvenience is experienced by the patient.[38]—*Trans.*]

OLEUM OLIVÆ.

Olive Oil.

(See also the section on *Nutritive Injections*).

Krueg[39] has injected four to eight drachms of olive oil per diem in the case of a lunatic who refused food. The injection fluid being expelled slowly caused no pain and left only a trifling redness.

OLEUM TEREBINTHINÆ.

Oil of Turpentine.

Pure oil of turpentine has been administered hypodermically in doses of 16 minims by M. Luton, but without success, in a case of obstinate sciatica. The injection caused intense pain and was followed by abscess. Turpentine injections have been used successfully in the treatment of carcinomata, sarcomata, and other neoplasms by Vogt, but they are included in the class of interstitial injections which do not fall within the scope of our inquiry.

OLEUM TIGLII. OLEUM CROTONIS.

Croton Oil.

Béhier injected into the thigh one drop of croton oil to obtain its purgative action. No purgative effect was induced, and there was local sloughing. We may observe that Langenbeck has inserted croton oil under the skin without producing diarrhœa, and that it has also been used hypodermically in the treatment of erectile tumors.

OPIUM.

Opium.

Opium in aqueous solution (Lobl), the extract (Lebert), and the tincture of opium (Wood, Hunter, V. Franque, etc.), have been exhibited hypodermically (Eulenburg), but they are now quite abandoned. Opium is chiefly indicated in the treatment

of diarrhœa, in which disease it appears to be a more efficient remedy than morphine.

PAPAVERINA.

Papaverine.

Papaverine has been used hypodermically by Messrs. Leidesdorf and Schüle in cases of insanity, in the form of hydrochlorate or phosphate (six to twelve minims of a 1-in-12 solution of the salt).

The phosphate of this alkaloid produced abscess and sloughing.

PARACOTOINUM.

Paracotoin.

Paracotoin, which was isolated from Paracoto bark (of undetermined origin) in 1876 by Messrs. Jobst and Hesse, exists in the form of a yellowish-white crystalline powder, with an insipid taste and a peculiar, slightly balsamic odor. Slightly soluble in water, it dissolves in boiling alcohol, is sparingly soluble in cold alcohol and in boiling water, and is insoluble in ammonia (Wurtz). The physiological effects of paracotoin are identical with, but less pronounced than, those of cotoin (see this).

The method of using it is the same as in the case of cotoin; it has been used subcutaneously by M. Balz in the treatment of cholera.

The only drawback to the use of paracotoin is its sparing solubility in water. The best solution is one made with equal parts of glycerin and water.

PARALDEHYDUM.

Paraldehyde.

Paraldehyde is a polymeric modification of aldehyde. [That is several molecules—in this case three (3)—of ordinary aldehyde (C_2H_4O) have united to form *one* molecule of paraldehyde.—R.] It is soluble in water (1 in 10), less soluble in hot water than in cold, and is used in the same way as syrup of chloral. Introduced into therapeutics by Messrs. O. Berger, Morselli, and Bergesio, it is a hypnotic in doses three times as

large as that of chloral. According to M. Peretti it exercises no injurious action on the heart even in large doses; the hypnotic effect is produced rapidly, without a stage of excitement or of congestion. The number of pulse beats is generally diminished. The respiratory movements are slowed down, the temperature falls, and the secretion of urine is diminished (?). Nausea, vomiting, and vertigo have sometimes been observed after its administration. In large doses, sensibility and reflex movements are abolished, and death takes place from arrest of respiration. It exerts its action on the cerebral hemispheres, the medulla, and the spinal cord. There is an *antagonism* between strychnine and paraldehyde. (Dujardin-Beaumetz.)

The physiological action of paraldehyde has been fully investigated by M. Cervello (1883) in the laboratory of M. Schmiedeberg, and since then by various authors, viz., Messrs. Albertoni, Frederici, Quinquaud, Hénocque, Bochefontaine, Prévost, and Coudray, who mostly confirm the results obtained by Cervello. Nevertheless, some of the results are matters of controversy, especially as regards the action of paraldehyde on the blood.

At first used as a hypnotic, it has been lately used as a sedative in mania, melancholia, etc., by numerous authors (Morselli, Peretti, Berger, Langreuter, Masius, etc.). M. Kêraval was the first to use it hypodermically.

Paraldehyde,
Cherry-laurel water, . . of each 10 minims
Distilled water, ... up to 40 minims.
(*Kéraval.*)

It is necessary before using this solution to take the precaution of plunging it into hot water, not that heat increases the degree of solubility, far from it, but because by preventing crystallization of the paraldehyde, it insures its being kept in a fluid condition and, consequently, its thorough admixture with the vehicle. By this expedient it is possible to administer 16 minims (= 4 minims of paraldehyde).—P. Kéraval.

Paraldehyde, ... 56 minims
Spirit of peppermint, . . . 1 minim
Olive oil, ... to make 112 minims.
(*Langreuter and Strubisch.*)

PEREIRINA.

Pereirine.

Pereirine is extracted from the *Pao-pereira*, the bark of *Geissospermum lœve* Baillon, which has been used for a very long time (it was used in 1838 by M. Correia, of Los Santos, Brazil, who gave it its name) on account of its tonic, febrifuge and antiscrofulous properties, in a great variety of diseases. M. Freire, of Rio de Janeiro, investigated it with great care in 1879. It appears in the form of a yellowish, non-crystalline, inodorous powder, has a bitter taste, is sparingly soluble in water, but dissolves in ether, alcohol, and chloroform. The pereirine of commerce is an impure product. Of its salts, the hydrochlorate, sulphate, and valerianate are the only ones which have, as yet, been used therapeutically.

For hypodermic purposes the neutral hydrochlorate alone is capable of being used with advantage; it crystallizes in quadrangular prisms of a vermilion tint. It does not dissolve in ether, but is soluble in all proportions in water. Pereirine and its salts have an intensely disagreeable bitter taste.

According to Messrs. Cypriano Freitas and Bochefontaine, pereirine has no local irritant action and abolishes the functional activity of the central gray nervous substance, and more especially of the gray matter of the medulla and spinal cord (abolition of voluntary movements, afterward of the reflexes, and finally of the excitability of the motor and sensory nerves).

M. Lacerda drew the following conclusions from his physiological experiments: (1) That the hydrochlorate of pereirine in poisonous doses paralyzes the vaso-motor centres in the bulb, as well as the cardiac fibres of the vagus; (2) that it does not possess any antithermic action, but that, on the contrary, it increases the temperature by several tenths of a degree; (3) that this salt does not appear to exert any action on the secretions, and that it does not directly modify the properties of muscular fibre or the excitability of the motor nerves; (4) that its action on the heart is antagonistic to that of digitalis.

Hydrochlorate of pereirine, . 1–2 grains
Distilled water, . . . up to 24 minims.
Sixteen minims = $\frac{2}{3}$–1$\frac{1}{3}$ grains.

(*Almir-Nina.*)

Hydrochlorate of pereirine delays fermentation (Almir-Nina). According to the same author the action of pereirine on the temperature is still an open question.

In *medicinal doses* pereirine gives rise neither to intellectual nor to sensorial troubles; its influence on the circulation is trifling and irregular.

The dose is 16 minims of the solution in each arm. This solution produces only slight inflammatory phenomena (redness, pain either spontaneous or excited) which disappear quickly. In no case have scars been produced.

Therapeutic Uses.—Pereirine and its salts, which have been mostly used in intermittent fevers (15 grains per diem, 1½ to 6 grains subcutaneously), have also been tried, but so far without any decided results, in the treatment of pernicious fevers and other diseases.

[Pereirine is one of the numerous substitutes for quinine, and is almost unknown in England and the United States. It is used largely in the West Indies, hypodermically and otherwise, as a febrifuge and antiperiodic. A short notice of its virtues may be found in a letter from Dr. Daunt, published in the "Medical Times and Gazette," vol. i., 1884, p. 443.—*Trans.*]

PHYSOSTIGMINA. PHYSOSTIGMATIS EXTRACTUM.

Physostigmine. Eserina, Eserine. Extract of Calabar Bean.

[Physostigma or Calabar bean contains an alkaloid known as physostigmine or eserine. In 1865 the term eserine was applied by Vée and Leven to an alkaloid differing from physostigmine. The existence of this has, however, not been confirmed beyond doubt. At the present time, the terms *eserine* and *physostigmine* are used synonymously both by medical writers and in commerce.—R.] Most of the salts of physostigmine are readily soluble in water. The solution of sulphate of physostigmine on exposure to air and light assumes a violet-red color, more or less intense, the change of tint being much less active in the case of the alkaloid itself than of its sulphate. The salicylate of physostigmine is soluble in 150 parts of water and in 12 parts of alcohol. The solutions of this salt are yellow, but become red under the influence of

light. Calabarine (Harnack and Witkowski), another alkaloid contained in Calabar bean, has a tetanic action, and is only rarely used medicinally.

As in the case of coniine (see CONIINA), the results of various investigators are very contradictory, and this is doubtless due to the varying composition of the preparations employed and also to the varying proportion of alkaloids contained in the Calabar bean. Nevertheless, the preparations of Calabar bean act alike on the eye, the salivary glands, the intestines, heart and respiration; their action on the spinal cord depends on the proportion of physostigmine, or of calabarine, respectively

Chief Physiological Effects of Physostigmine.— Pallor, then redness of the skin, abdominal pains, vomiting, embarrassed respiration, vertigo, feeling of extreme languor, myosis, salivation, sweats, slowing of the pulse (Fraser: toxic phenomena observed in himself). Watery and muco-sanguinolent diarrhœa, slowing and finally cessation of respirations. Complete paralysis and collapse (Evans). Death by asphyxia. Paralyzing effect on the central nervous system; stimulating, then paralyzing effect, on the peripheral nerves. A dose of $\frac{1}{140}$ to $\frac{1}{70}$ of a grain is sufficient to induce poisonous symptoms in man (Harnack, according to whom there is no action on the peripheral nerves, but a direct action on the muscular fibre, voluntary and involuntary). In veterinary medicine, eserine has frequently been employed (Peters, Cadiot), especially in the treatment of colic in the horse. According to M. Cadiot, the dose of sulphate of physostigmine for the horse should be from $1\frac{1}{4}$ to nearly 3 grains. This author used a one-in-twenty solution. In the dog, the dose is from $\frac{1}{140}$ to $\frac{1}{14}$ of a grain. In canine chorea physostigmine seems to do more harm than good. In a case of epilepsy with idiocy, physostigmine, administered in doses of $\frac{1}{140}$ of a grain three days in succession, increased alarmingly the number of the fits. Elimination is effected by the saliva and bile.

The mutual antagonism between physostigmine and atropine is admitted by most authors, but is denied by Messrs. Fröhlich and Rossbach. Some authors have also asserted a reciprocal antagonism between physostigmine and strychnine.

Calabarine produces in the frog tetanic symptoms (Harnack); it has been used hypodermically by Dr. Bartholow.

Local Effects.—Sulphate of physostigmine produces very sharp pain which lasts from one to six hours. (Suarez y Cruz.)

Extract of Calabar bean, . . 2 grains
Distilled water, ... up to 80 minims.
Ten minims = $\frac{1}{4}$ of a grain.
(*Watson.*)

One injection every two hours. (The dose may be increased to $\frac{3}{8}$ of a grain.)

Extract of Calabar bean, . . . 2 grains
Distilled water, . . . up to 112 minims.

(One to two syringefuls may be given = $\frac{2}{7}$ to $\frac{4}{7}$ grain of extract. ("Pharmacopœia of Vienna Clinique.")

Extract of Calabar bean, . . . 1 grain
Glycerin, ... up to 64 minims.
(*Rosenthal.*)

This solution has been used by M. Silbermann (1880) in two cases of tetanus in young children (one case of cure).

Physostigmine, ... 1 grain
Alcohol, ... q. s.
Distilled water, . . . up to 128 minims.
Sixteen minims = $\frac{1}{8}$ of a grain.
(*Erlenmeyer.*)

Physostigmine, ... 1 to 5 grains
Distilled water, ... to 112 minims.
Four minims = $\frac{1}{28}$ to $\frac{1}{6}$ of a grain.
("Phar. of Vienna Clinique.")

Physostigmine and its sulphate may be injected in doses of from $\frac{1}{24}$ to $\frac{1}{18}$ of a grain [in both these cases, the sulphate, or better, the hydrobromate, should be used.—R.] (Bouchut), a dose which may be renewed 3 or 4 times daily, owing to the rapid elimination of the drug. These doses, and consequently the following, are perhaps too large; we find indeed in the memoir of M. Bouchut ("Recherches thér. sur l'action de l'éserine dans la chorée," 1875), that doses of from $\frac{1}{70}$ of a grain of eserine to $\frac{3}{70}$ of a grain of sulphate of eserine produce either a slight degree of paralysis of the diaphragm, or some embarrassment of the same muscle (pp. 10 and 11). Anger, in a case of tetanus, injected from $\frac{1}{5}$ to $\frac{1}{3}$ of a grain daily; in another

case (Delamarre, "Thèse," Paris, 1876) $\frac{2}{4}$ of a grain were used in each injection till a dose of nearly 3 grains *per diem* was reached.

Salicylate, or hydrochlorate of physostigmine,	1 grain
Distilled water,	up to 1 ounce 80 minims.

Eight minims of this solution, that is to say, one-half of a Pravaz syringe containing 16 minims, are equivalent to $\frac{1}{720}$ of a grain of the physostigmine salt (Eulenburg, "Medicinal Kalender," 1883, Lewin).

[The following formula is from Martindale and Westcott's work:

Injectio Physostigmatis Hypodermica.

Extract of Calabar bean,	10 grains
Alcohol,	10 mmims.
Rub together till smooth, and add	
Acacia, in powder,	10 grains
Mix, and add gradually	
Distilled water,	to $\frac{1}{2}$ fluid ounce.

Dose.—3 to 12 minims.—*Trans.*]

Therapeutic Uses.—Ptosis (Schelske), enuresis (Frommüller, poisoning by strychnine (Newman), tetanus (Watson, 1866, Monti, Rothrock, Franzolini, Duffy, Suarez y Cruz, Th. Anger, Reulos), chorea (Harley, Ogle, Bouchut, Cadet de Gassicourt and Suarez y Cruz), trismus neonatorum (Eschenburg: from 1 to 5 drops of watery solution ($\frac{1}{2}$ of a grain in 64 minims of water) of extract of Calabar bean.

In veterinary medicine the sulphate of physostigmine has been used for horses suffering from colic induced by surfeit and chronic dyspepsia (Dieckerhoff) in doses of from $\frac{1}{2}$ to $1\frac{1}{2}$ grains, in a solution of:

Sulphate of physostigmine,	1 grain
Distilled water,	up to 112 minims.

Lindgvist recommends the same salt in doses of $\frac{2}{4}$ of a grain in the horse; to that of $\frac{2}{4}$ grain for 160 ounces body weight in the dog (maximum dose). It is especially useful in colic in the horse, dyspepsia and gastric atony in the ox. Möller rec-

ommends its use in doses of $\frac{3}{4}$ of a grain to $1\frac{1}{2}$ grain, in constipation due to a paretic condition of the intestines in the larger domestic animals.

Hydrobromate of physostigmine is soluble in water (especially warm water) and in alcohol, and slightly soluble in glycerin. It is perfectly neutral and produces no local irritation. Its solution is more stable than that of the other salts of eserine (Duquesnel). We do not know whether it has been used hypodermically.

PICROTOXINUM.

Picrotoxin.

Picrotoxin, obtained from the seeds of *Anamirta Cocculus*, is not an alkaloid. It is sparingly soluble (1 in 150) in water, and is freely soluble in boiling alcohol and in ether, also in alkalies, and in acids, but it forms no salts with the latter.

Picrotoxin in poisonous doses causes convulsions; it acts specially on the bulb, and, probably, on the whole extent of the spinal cord (Glover, Planat); its action on the cerebellum and corpora quadrigemina (Glover) is far from being proved.

Gubler has used picrotoxin hypodermically in labio-glosso-laryngeal paralysis; he obtained, after the lapse of some days, marked improvement. The dose was $\frac{1}{70}$ of a grain. Locally it produced persistent induration. Westbrook used it subcutaneously with benefit, for the night sweats of phthisis in doses of $\frac{1}{140}$ to $\frac{1}{48}$ of a grain. [Westbrook, "Archiv de Pharmacie," p. 867, 1884. See a *resumé* of this paper in the "Bristol Medico-Chirurgical Journal," vol. ii., p. 211. Drs. Westbrook and Platt used the drug in nine cases. It entirely checked the night sweats in six cases and afforded great relief in two. The drug was administered subcutaneously or by the mouth, at intervals of two to ten days, and in doses of from $\frac{1}{60}$ to $\frac{1}{30}$ of a grain. "It was found in some cases that $\frac{1}{30}$ of a grain hypodermically, at night, would control the sweats for ten nights following." Dr. Murrell also obtained good results but with much smaller doses,—he administered from the $\frac{1}{180}$ to $\frac{1}{60}$ of a grain, and had only one failure in twenty cases.—*Trans.*]

PILOCARPINÆ HYDROCHLORAS (ET NITRAS).

Hydrochlorate (and Nitrate) of Pilocarpine.

Chief Physiological Effects.—Congestion of the skin, principally of the face; increase of the secretions, especially of saliva and sweat; acceleration of cardiac pulsations; initial increase of temperature (sometimes persistent, if diaphoresis fails) with consecutive fall in accordance with the greater or less abundance of perspiration.

In medicinal doses, the salts of pilocarpine never produce vomiting, diarrhœa, and that sense of extreme lassitude which frequently results from the administration of infusion of jaborandi. We may observe that in doses of less than $\frac{2}{3}$ of a grain the unpleasant effects resulting from the administration of the salts of pilocarpine have been for the most part observed in patients suffering from cardiac affections.

Local Effects.—Hypodermic injections of pilocarpine salts have never in our experience given rise to any accident whatever.

Nitrate or hydrochlorate of pilocarpine, ...	2 grains
Distilled water, . . .	up to 140 minims.

Dose—5 to 10 minims (= $\frac{1}{14}$ to $\frac{1}{7}$ of a grain) and upward.

It is well to begin with small doses, say $\frac{1}{14}$ of a grain, and to increase the dose cautiously to $\frac{1}{7}$, $\frac{2}{7}$, or $\frac{1}{2}$ of a grain. When the dose exceeds $\frac{1}{4}$ of a grain it is advisable to give it in divided doses, one half in the morning and the rest in the evening. We have never given a larger dose than $\frac{3}{4}$ of a grain, though some authors have administered as much as $1\frac{1}{2}$ grains, but this has been given by the mouth.

Therapeutics.—Pilocarpine is chiefly indicated in those cases where it is desirable to check or diminish excesssive salivary or sweat secretion. Injections of pilocarpine salts have been specially used in the treatment of various forms of dropsy, in pleurisy, bronchitis, pneumonia, acute articular rheumatism, epilepsy, eclampsia, mercurial poisoning, intermittent fever (Prokop, Rokitansky), unilateral sweats (André), fœtid perspiration of the feet (Armaingaud), rapidly progressive posterior sclerotico-choroiditis with muscæ volitantes and

threatened detachment of the retina (Dehenne, Deniau), detachment of the retina (Dianoux and others), some forms of polyuria (Roques, Huchard and Ducroux), syphilis (Lewin), diphtheria (Lehwess and Guttmann), anasarca in the horse (Signol). It has been given internally in combination with pepsin (Lereboullet, Lepidi-Chioti), in cholera (Maestre Perez). It seems difficult as yet to pronounce definitely as to the value of this therapeutic agent. There is an undoubted *antagonism* between the salts of pilocarpine and belladonna or atropine.

[Messrs. Martindale and Westcott give the following formula:

Nitrate of pilocarpine, . . .	1 grain
Distilled water, ...	20 minims.

Dose—2 to 6 minims.

Besides the diseases mentioned by the authors, pilocarpine has been used to assist uterine contractions, in uræmic coma, asthma, hydrophobia (mostly unsuccessfully), puerperal convulsions, and to relieve the pains of tabes dorsalis. An interesting case of cure of alopecia from pilocarpine injections is recorded in the "Lancet," vol. i., 1882. Brünauer has used it with success in a case of tetanus of rheumatic origin. M. Chéron has injected $\frac{3}{4}$ of a grain daily as a galactagogue, with complete success in eight out of nine cases. Dr. Purjeck has cured a case of atropine poisoning, and Dr. Roth a case of stramonium poisoning by hypodermic injections of pilocarpine.—*Trans.*]

PLATINUM.

(*See under Hydrargyrum.*)

POTASSII BROMIDUM

Bromide of Potassium.

M. Bergeron has used it hypodermically in a case of mania; its use was followed by sloughs. M. Alling, in a case of puerperal eclampsia, met with suppuration after each injection ($7\frac{3}{4}$ grains in 40 minims of water). M. Asshurot has met with ulceration after the hypodermic injection of bromide of potassium. Dr. Weir Mitchell, on the other hand, has never observed local ill effects after these injections, which only occur, according to Pepper, in cases of idiosyncrasy.

Messrs. Martin-Damourette and Pelvet, who have also administered potassium bromide hypodermically, assert that in *small doses* it produces marked hypnotic effects. They have also stated that its injection caused: (1) Pain. (2) Muscular tremor, affecting in the first instance the muscles adjoining the injected point, and gradually extending, after two or three minutes, to the most distant muscles. (3) Enfeeblement, first of movement and afterward of sensibility. This condition is manifest after 5 or 10 minutes in the limb in which the injection has been made and becomes general after 20 to 40 minutes. Sensibility disappears in the following order:—skin, motor nerves, spinal cord, muscles (those which have been affected by absorption), for the muscles of the injected region lose their sensibility in a few minutes, by imbibition, before they are affected by encephalic poisoning. Respiratory movements cease soon after voluntary movement. (4) Diminution of capillary circulation, and, finally, arrest of the heart. Martin-Damourette and Pelvet say that death is at the last due to paralysis of the respiratory muscles, contrary to the opinion of Eulenburg and Guttmann, who attribute death to cardiac palsy. (5) Lowering of the temperature and increase of the secretions. (6) In man, enfeeblement of the generative functions.

Messrs. Martin-Damourette and Pelvet think it safer not to exceed at one dose 32 grains in one injection, lest local disturbances might ensue. They are further of opinion that even when several punctures are made, the dose should not exceed one drachm.

M. Luigi Frigerio, and afterward M. Carmelo Andromico, have used hypodermically a solution of the following composition:

Bromide of potassium, . . .	$\frac{1}{3}$ grain
Distilled water, ...	up to 16 minims.

The former has given as much as 8 grains in each injection, but this dose has caused ill effects locally; he has seen abscess and sloughing even from a dose of $3\frac{1}{2}$ to 4 grains. He selects the skin of the forearm for injection, and observes that by gently manipulating the part injected it is possible to avoid the risk of suppuration. It is well also to enjoin rest of the limb, and M. Frigerio often sends his patients to bed. By

this treatment the frequency of epileptic convulsions is diminished. Local accidents, though frequent, are inconsiderable.

POTASSII CYANIDUM.

(*See Acidum Hydrocyanicum.*)

POTASSII IODIDUM.

Iodide of Potassium.

M. Eulenburg has used an aqueous solution (1 in 3) of potassium iodide, of which he injected 16 minims at one time. In many cases of scrofulous glandular enlargements, and more frequently in glandular affections due to syphilis, which were treated by this method, he failed to obtain any good result. In syphilitic periostitis the treatment was not much, if any, more efficacious, and syphilitic cutaneous ulcers did not appear to heal more rapidly than when treated in the ordinary way by internal administration. He did not meet with more success in several experiments which he made in patients affected with rheumatic or scrofulous affections of the joints, even when the disease was treated from the beginning.

The therapeutic results reported by Dr. Thierfelder differ from those of Prof. Eulenburg. This author obtained certain and definite results from this use of the drug, which were rapid and decided in cases of osteoid pains. The same authority has, besides, made use of iodide of potassium in various other diseases; thus, in a case of chronic rheumatism of the cervical vertebræ, after two injections (1 grain in each), he obtained free movement of the head; in a case of hysteria and in a case of gastric ulcer with gastralgia, injections of potassium iodide produced effects analogous to those resulting from morphine injections. In short, Dr. Thierfelder believes that these injections are specially indicated in cases where the digestive functions require to be treated.

Locally, the same author observed after hypodermic administration of iodide of potassium, burning pain of varying intensity and duration; in some cases he noticed tearing pain radiating into the surrounding parts, and in two cases he met with circumscribed phlegmons.

Messrs. Fronmüller, Jakubowitz, and Mader also used hypodermic injections of iodide of potassium. Goldbaum injected

iodides of potassium and sodium in the asphyxial stage of cholera, with the object of studying the absorption of medicines.

The rapid absorption of iodide of potassium, according to Eulenburg, does not encourage us to expect local effects of any importance from its use. Concentrated solutions frequently produce local irritation and even suppuration. (These observations are, for the most part, borrowed from Eulenburg.) M. Gilles, of la Tourette, has used the following hypodermic injection of potassium iodide.

Iodide of potassium, ...	8 grains
Distilled water, ...	16 minims.

This solution produces no local accidents "provided that the solution is neutral, that the injection is made as deeply as possible in some part where there is abundance of cellular tissue, and that the punctures are at a sufficient distance from one another." They produce an unpleasant sense of smarting which speedily abates.

M. Besnier has also used iodide of potassium hypodermically, but he has not published his observations. M. A. Denis states in his essay that he has injected 8 grains of iodide of potassium without any ill effect beyond sharp pain at the moment of injection. M. L. Julien, in his "Traité des maladies vénériennes" (1879, p. 1060), says, "In conclusion, the hypodermic injection of iodide of potassium has been highly recommended (A. Martin)." Unfortunately, M. Julien does not give any of the bibliography on this subject, and our own researches are, so far, without result. There is no reference to hypodermic injections of iodide of potassium in Messrs. Belhomme and Martin's "Traité de la syphilis," edition of 1876.

Iodide of potassium, . . .	24 grains
Distilled water, . . .	up to 112 minims.

Although this solution is inconvenient on account of the pain which it sometimes causes, Prof. Carbo has obtained good results from its use.

M. Cantarano ("Il Movimento," January, 1883) has used iodide of potassium hypodermically, in the latter stages of syphilis, where, from any cause, the internal administration of the salt was contra-indicated. He did not meet with any local

troubles, as he took the precaution to select for injection parts which were richly supplied with connective tissue and by adding to the solution a small proportion of morphine; the fluid should be neutralized by the addition of a few drops of acetic acid and eight minims only should be injected at one time.

M. Parona ("Gazetta degli ospitali," 1884, Nos. 52, 53, 54, 55) condemns solutions of 8 grains in 16 minims for hypodermic use. The solution of this strength is nearly half-saturated and local accidents from its use are frequent. He has generally used solutions of 1½ to 3 grains in 16 minims of distilled water, gently warmed in a sand bath. According to this author cold injections are always productive of pain, more or less severe according to the strength of the solution, circumscribed phlegmons resulting from doses of 6 to 9 grains; tepid injections produce a less pronounced local reaction, especially after the application, for one or two hours, of an ice bladder. The combination of morphine with the iodide he deemed immaterial, the pain being only momentary. He frequently observed local disturbance from the injections recommended by Cantarano (8 grains in 16 minims).

In conclusion, the author thinks unfavorably of hypodermic injections of iodide of potassium; he points out the small quantity of salt which is introduced at a time into the system, the inconvenient results to which these injections may give rise, and, finally, he accords the preference to rectal injections. These contradictory statements tend to show that the iodides of potassium used have not been identical. Iodides vary greatly, the iodide of commerce being very impure. In a note published in the 68th number of the "Gazetta degli ospitali," M. Parona says that he had actually used the commercial iodide, but that the French iodide of potassium in a solution of 8 grains in 16 minims was neither very painful nor irritating.

[We have left this remark unchanged. But it is based on misconception or want of knowledge of the subject. There is no "commercial" iodide of potassium on the market, as distinguished from any "medicinal." It is true that sometimes a batch of iodide of potassium is found which contains slight impurities, but these are usually very small in quantity, and there is no justification for saying that "the iodide of commerce is very impure."—R.]

[Dr. Carl Schadeck has recently instituted a series of clinical experiments with the iodides of sodium and potassium in the treatment of syphilis, by the hypodermic method. The patients were soldiers in the Kiew military hospital. Eight cases were treated, ninety injections in all being made, and the largest number of injections made in one case was sixteen; in the others the number of injections was twelve, ten, nine, eight, and seven. The iodide of potassium was the salt mostly used, only eleven injections in all having been made with the iodide of sodium.

Iodide of potassium (sodium), .	40 grains
Distilled water, ...	150 minims.

The solution was prepared fresh day by day, and was carefully neutralized and filtered. A Pravaz syringe was used to make the injections and the needle was in twenty-six instances inserted perpendicularly, so as to carry the solution directly into the parenchyma of the gluteal muscles.

Dr. Schadeck's experience[40] is summarized as follows:— 1. Pain was either trifling or absent at the time of injection. 2. There was invariably secondary painful irritation, which varied in intensity and duration in different instances. 3. No abscess or inflammatory induration resulted at the point of injection. 4. In two cases, after nine or ten injections, an iodine exanthem in the form of acne pustules appeared on the face, trunk, and extremities. The eruption vanished when the injections were discontinued. 5. In two instances all syphilitic lesions were eliminated by the exclusive use of the salts of iodine hypodermically. 6. The results, so far as obtained, tend to show that mercury is not an essential in the treatment of syphilis.—*Trans.*]

POTASSII PERMANGANAS.

Permanganate of Potassium.

Hypodermic injections of potassium permanganate have been recommended by M. Lacerda in the treatment of the bites of venomous serpents. Dr. Brown also recommends these injections in diphtheria, in which disease he believes that the remedy acts as a specific.

Permanganate of potassium,	1 grain
Distilled water,	up to 112 minims.

Dose—32 to 48 minims after ligature of the limb above the wound.

QUINIDINA ET CINCHONIDINA.

Quinidine and Cinchonidine.

Quinidine, which is isomeric with quinine, possesses very nearly the same physiological properties. It was used first by Wunderlich in 1860. The *sulphate of quinidine*, sparingly soluble in water, but rendered soluble upon addition of an acid, was administered in typhoid fever by Strümpel, who regards it a superior to sulphate of quinine. Quinidine and its salts are not in use for hypodermic purposes.

Cinchonidine is isomeric with cinchonine. According to Bouchardat, it might be used as a substitute for quinine; Coronado and Gubler regard it as equal to quinine in therapeutic value. The *hydrobromate*, used hypodermically by the last-named authors, was found to be perfectly innocuous; it produced no signs of cinchonism or any local disturbance in doses of 6 to 8 grains. M. Chiron asserts that it is capable of producing epileptiform convulsions by irritation of the cortical motor centres, which, beginning in the muscles of the face, spread thence to those of the neck, arm, etc.

Bouchardat and Wedel say that sulphate of cinchonidine is as efficacious as sulphate of quinine. It has been prescribed with success in cases of intermittent fever, in doses of from 12 to 16 grains, without producing vertigo, tinnitus, visual troubles, weight of head, or obfuscation of the ideas. Its action is less toxic than that of quinine, but its effects are less marked and of shorter duration.

Sulphate of cinchonidine,	40 grains
Acetate of morphine,	$\frac{1}{2}$ grain
Distilled water,	up to 1 ounce.

12 minims = 1 grain of cinchonidine and $\frac{1}{80}$ of a grain of morphine. M. Machiavelli injected about 16 minims of this solution, substituting in this formula the hydrochlorate for the sulphate of cinchonidine.

Cinchonine, cinchonidine, and their salts are moderate in

price. Possibly some of the cinchonidine salts, especially the hydrobromate, might with advantage be substituted for quinine salts in hypodermic medication. [At the present time (July, 1889) the price of quinine sulphate has become so low—being about 25 cents per ounce, wholesale—that considerations of economy need not any longer control the choice between quinine and other cinchona alkaloids.—R.]

QUININA.

Quinine and its Salts.

Quinine is very sparingly soluble in water (1 in about 1600); it dissolves in ether [and in alcohol, chloroform, and dilute acids.—*Trans.*]

Principal Physiological Effects.—Antiputrescent and antifermentative (Binz); sialagogue, by reflex stimulation, in virtue of its bitterness; diminishes tactile sensibility, and dulls the sense of hearing, causes tinnitus aurium, and hallucinations of hearing; vertigo, sense of weight of head, confusion of ideas, carotid pulsations, cephalalgia, quinine intoxication, ataxic gait, apathy, drowsiness, general prostration; dilatation of the pupils, and nausea.

In Larger Doses.—Vomiting, delirium, deafness, occasionally blindness, and aphasia.

In Poisonous Doses.—Collapse, convulsions, and death.

There are increased volume of the red corpuscles, due to increased supply of oxygen, disappearance of amœboid movements of the white corpuscles, the number of which is diminished; the area of splenic dulness is diminished.

In moderate doses, up to 15 grains [this is a decidedly large dose, and the symptoms which are described do not follow from moderate doses.—*Trans.*], there are first increase and then slowing of the cardiac pulsations, and lowered blood pressure; finally, there is arrest of respiration, followed by paralysis of the heart.

In healthy men and animals the effect on the temperature is either nil or trifling. With the exception of the various fevers dependent on malarial poison, in which quinine acts as a powerful antipyretic, its action on the temperature is still *sub judice*.

Elimination is effected rapidly and chiefly by the kidneys,

the secretion of urine becoming very abundant, while the secretion of sweat is arrested. In some rare instances various eruptions (eczematous and scarlatiniform) and hæmaturia have been observed after the administration of quinine. Some cases of tetanus have been ascribed to injections of quinine (?).

Local Effects.—As a general rule, great circumspection is necessary in using hypodermic injections of quinine and its salts; for, in many instances, it produces, besides pain, persistent indurations, followed by suppuration and even by gangrenous sloughs and tetanic symptoms, especially with the sulphate. It is advisable to inject no more than 16 minims at one point and to expel the fluid very gently. The hydrochlorate appears to be the most suitable of all the salts of quinine for hypodermic injection. In cases of urgency, such as pernicious fevers, we ought not to be deterred from using hypodermic injections by the risk of local accidents. For this reason we deem it right to mention some solutions, although they are often faulty, which have been proposed by various writers, for they possess at least an historic interest.

M. Galvani recommends that 8 to 12 grains of bisulphate or hydrochlorate of quinine should be dissolved in 3 minims of distilled water in a capsule or glass tube, by the aid of a water-bath. The salts of quinine should be dissolved by heat alone without the aid of acids, and thus prepared they are not apt to produce local troubles. This author's practice is, however, open to question, when we find that he recommends the use, for three days, of cold water compresses at the point of puncture, which are to be renewed every ten minutes.

Pure quinine is not suitable for hypodermic use on account of its sparing solubility. Otto used a solution of it in ether and in this way he was able to administer it in a concentrated form without local ill effects.

Quinine, ...	8 grains
Ether, ...	20 minims.

[In the experience of some of the largest hospitals of New York City, the *Bimuriate of Quinine and Urea,* which is soluble in 1 part of water, is the most suitable and least liable to produce pain or abscesses.—R.]

Prof. Eulenburg found that this solution produced considerable local irritation, and he recommends its abandonment.

M. Kuhn, of Strasbourg, had previously recommended an ethereal solution, and Dr. Bartholow also employed it, but on the other hand, M. Ventzel Bernatzik always found its use followed by local accidents. M. Burdel used the following solution with benefit in several severe cases of pernicious fever:

Sulphate of quinine, . . .	16 grains
Ether, ...	up to 64 minims.

Dose.—16 minims = 4 grains.

The injection was repeated daily and no ill results followed.

[There must be an error in the above formula, as *sulphate* of quinine is almost insoluble in ether. But *hydrate* of quinine, that is, the freshly precipitated alkaloid, is soluble in this menstruum.—R.]

The basic, or so-called neutral, sulphate, on account of its sparing solubility in water and alcohol, can only be used with great difficulty in a sufficient degree of concentration; it is moreover necessary, in order to increase the degree of solubility, to acidify the solution with sulphuric, hydrochloric (Bernatzik), nitric (Desvignes), citric (Hunter), tartaric (Bourdon), or acetic acid. These concentrated solutions produce, in consequence of their acidity, local irritations which may result in ulceration or suppuration. These accidents may be avoided by the use of very dilute solutions, but they, in their turn, possess the inconvenience of necessitating numerous injections; moreover such solutions do not keep well. Glycerin is the best vehicle; of this it requires 6 parts by weight, for solution, with the aid of heat; of cold glycerin, however, it requires 40 parts. M. Denis, who has employed a solution of the sulphate in glycerin, has discontinued this form of solution, as he could only obtain weak solutions ($\frac{1}{4}$ grain to 8 minims) even with the aid of heat.

Moore used the following solution:

Sulphate of quinine, . .	24 grains
Diluted sulphuric acid . . .	10 minims
Distilled water, . . .	up to 240 minims.

10 minims = 1 grain.

[In order to avoid too great acidity of the solution, an error which may readily occur by using a *prescribed* quantity of acid, it is preferable to add diluted acid very cautiously to the quinine salt, which should have been previously rubbed up

with the larger portion of the water to a perfectly smooth milk, until the liquid is *nearly*, or just clear. Then filter.]

This solution being difficult to use, it was soon set aside for the acidulated preparation of M. Craith:

Sulphate of quinine, ...	2 grains
Diluted sulphuric acid, . . .	q. s.
Distilled water, ...	up to 16 minims.

Later on, Prof. Eulenburg suggested the following formula:

Sulphate of quinine, ...	2 grains
Diluted sulphuric acid, . . .	q. s.
Distilled water, ...	up to 20 minims.

These latter formulæ were of uncertain composition owing to the varying proportions of acid necessary to effect solution. Therefore, Claude Bernard, seeing the numerous accidents which ensued from their use, attributed these ill effects to the sulphuric acid, for which he proposed to substitute tartaric acid.

Bourdon, Gualla, and Vinson adopted the following formula:

Sulpnate of quinine, . . .	3 grains
Tartaric acid, ...	1½ grains
Distilled water, ...	up to 32 minims.

16 minims = 1½ grains.

Pilhan-Dufeillay and Decaisne prepared an extemporaneous solution by dissolving the quantity of salt required for injection in a sufficiency of Eau de Rabel [the equivalent of the French Pharmacopœia for our acidum sulphuricum aromaticum, though the latter is considerably weaker], a proceeding not only inexact, but as often as not impracticable, and by which they introduced another irritant, viz., alcohol, into the formula.

The formula of Pilhan-Dufeillay is:

Sulphate of quinine, ...	3 grains
Eau de Rabel, ...	7 minims
Distilled water, ...	up to 16 minims.

We have used it at the Bicêtre without any more serious trouble than pain and induration, but we only used 3 minims

of Eau de Rabel, which we found sufficient to effect solution of the quinine salt. We may here remark that if the greater number of quinine solutions proposed by various authors are to be rejected on account of the accidents to which they may give rise, it is not less true that, in cases where they must be used, it is possible to avoid, to a great extent, the inconveniences which might otherwise result by care in the operative procedure; this explains why, in the hands of some physicians, even very irritating solutions do not give rise to local troubles.

M. A. Denis, from whom we borrow these remarks, after considering all the methods which had been tried to attain the desired end, says that after using tartaric acid in the first place, he set it aside for sulphuric acid, as he found that the latter caused much less pain. The solution which was used in the first instance was prepared in the following manner by Mr. Hepp. The quinine sulphate was first triturated with the tartaric acid in a mortar, a little water was then added, and the whole heated in a water bath; the remainder of the water was then added, allowance being made for evaporation, and after filtration a limpid fluid was obtained, containing—

Sulphate of quinine, ...	3 grains
Tartaric acid, ...	1 grain
Distilled water	20 minims.

This solution, although it was superior to all the preceding, nevertheless threw down a deposit after some time; he therefore tried the following prescription:

Sulphate of quinine, . . .	24 grains
Diluted sulphuric acid, . . .	15 minims
Distilled water, . . .	up to 168 minims.

7 minims = 1 grain.

M. Hepp tried to reduce the acidity of this preparation, which made it too irritating, and prepared a fresh solution in such a way that the sulphuric acid would be adjusted so as to just form the bisulphate or acid sulphate of quinine.

Sulphate of quinine, . . .	24 grains
Diluted sulphuric acid, . . .	12 minims
Distilled water, . . .	up to 168 minims.

1 grain in 7 minims.

This solution reddened litmus paper, and preserved its limpidity without any precipitate for several months. He in-

jected ½ of a grain of the sulphate and he believed that it would have been easy to obtain a greater degree of concentration by warming the solution before injection. This plan, which Mr. Denis thought it desirable to avoid, was successfully carried out by Dr. Goldschmidt, of Grafenstaden, for whom M. Hepp prepared the following solution:

Sulphate of quinine, . . .	12 grains
Tartaric acid, ...	4 grains
Distilled water, ...	up to 24 minims.

This solution threw down a large deposit in the cold, but soon became clear again after immersion for a short time in boiling water. Dr. Lente, of New York, used the subjoined formula:

Sulphate of quinine, ...	15½ grains
Diluted sulphuric acid, . . .	18 minims
Carbolic acid, ...	1 grain
Water, ...	up to 112 minims.

16 minims = ½ grain.

Out of 300 injections there were only two instances of abscess and one of slough. One is naturally astonished at these results with a fluid containing such a large proportion of acid, and much more than enough to produce solution.

Many of these preparations are open to criticism. Many authors employ the term *sulphate of quinine* without specifying to which of the two sulphates they refer, and hence arises a most regretable confusion. [In the case of American or English authors it is safe to say that only the officinal, "basic" sulphate of quinine is meant, when they speak of it. —R.] This uncertainty characterizes the solution of M. Ravicini (of which he administers six syringefuls per diem in typhoid fever) the sulphate of quinine (basic or neutral) being insoluble:

Sulphate of quinine, . . .	25 grains
Morphine hydrochlorate, . .	½ grain
Distilled water, . . .	up to 250 minims.

Desvigne's formula is:

Sulphate of quinine, ...	4 grains
Nitric acid (dilute ?), . . .	2 minims
Distilled water, ...	up to 48 minims.

1 grain in 12 minims.

One of the authors has injected the following solution, which has also been used by other authors, in a severe case of typhoid fever:

Sulphate of quinine, ...	1½ grains
Acetic acid, ...	q. s.
Distilled water, ...	up to 16 minims.

This solution gave rise to considerable local irritation and abscess, probably due to the adynamic condition of the patient.

The next two formulæ are taken from Bernatzik:

Sulphate of quinine, . . .	12 grains
Diluted hydrochloric acid, . .	8 minims
Distilled water, . . .	up to 24 minims.

2 minims = 1 grain.

Sulphate of quinine, ...	10 grains
Hydrochlorate of morphine, . .	1 grain
Diluted hydrochloric acid, . .	6 minims
Distilled water, . . .	up to 50 minims.

5 minims contain 1 grain of the quinine and $\frac{1}{10}$ of a grain of the morphine salt. [This formula and that of Ravicini would be much improved by the substitution of hydrochlorate for sulphate of quinine.—*Trans.*

Sulphate of quinine, ...	8 grains
Diluted sulphuric acid, . . .	1½ minims
Distilled water, ...	up to 64 minims.

12 to 24 minims = 1½ to 3 grains.

This preparation, which is recommended by Dr. Bartholow, should be carefully filtered to remove undissolved particles of the salt and foreign bodies. [In the last edition of his work, Dr. Bartholow gives, as the best sulphate preparation, the following formula:

℞ Quininæ disulphatis, ...	gr. 50
Acidi sulphur. dil., ...	♏ 100
Aquæ, ...	fl. oz. 1
Acidi carbolici liquefacti, . . .	♏ 5.

Solve. *Trans.*]

The *bisulphate of quinine*, really the neutral sulphate [not as to reaction, but in a chemical sense], though commonly styled the acid sulphate, is much more soluble than the sul-

phate, and is consequently more suitable for hypodermic purposes. It dissolves with vivid blue fluorescence in 10 parts, while the sulphate requires 740 parts, of water at 59° F. It is freely soluble in alcohol, and it dissolves in three parts of warm glycerin, forming a solution which will keep good an indefinite time.

Eulenburg makes use of the following solution:

Bisulphate of quinine, . . .	6 grains
Glycerin, ...	up to 64 minims.

Sixteen minims = 1½ grains.

One or two syringefuls are generally sufficient. This prescription may be modified by mixing equal parts of water and glycerin.

Vée, and afterwards Gubler ("Commentaires du Codex"), suggested the following solution:

Acid sulphate of quinine, . . .	1 grain
Distilled water, ...	up to 12 minims.

Rosenthal's solution:

Acid sulphate of quinine, . . .	2 grains
Distilled water, ...	up to 12 minims,

is apt to deposit crystals of quinine sulphate in the cold.

The *basic hydrobromate* ("neutral") and the "*acid*" *hydrobromate* of quinine have been used hypodermically by Gubler, Soulez, and by Raymond. The former salt, which is richer than the sulphate in alkaloid [this is not correct; the percentage in alkaloid quinine, calculated as anhydrous, in the more common quinine salts (crystallized) is as follows: acetate, 84.3; bisulphate, 59.1; hydrobromate, 73.5; hydrochlorate, 81.7; quinine and urea hydrochlorate (bimuriate), 69.0; lactate, 78.2; salicylate, 68.8; sulphate, 74.3; valerianate, 72.9.—R.], is soluble, according to Eulenburg, in four parts, and according to Boïle, in ten parts of glycerin. It dissolves in 16 parts of cold water, and in 3 parts of alcohol at 59° F.

The *acid hydrobromate* is very soluble; according to Gubler its action appears to differ from that of quinine sulphate by its being less apt to produce symptoms of cinchonism, and by its marked sedative and hypnotic influence on the nervous system. Injections of quinine hydrobromate cause considerable pain.

Gubler's solution (1 part in 10).

Neutral hydrobromate of quinine, .	1½ grains
Alcohol, ...	4 minims
Distilled water, ...	up to 16 minims.

[This is the hydrobromate officinal in the U. S. Pharmacopœia.—R.]

Dardenne's solution for use in intermittent fevers:

Acid hydrobromate of quinine, .	3 grains
Diluted sulphuric acid, . . .	1 minim
Or, tartaric acid, ...	1½ grains
Distilled water, ...	up to 32 minims.

Auliffe, of St. Denis, Réunion, recommends the following prescription:

Hydrobromate of quinine, . .	8 grains
Ether, ...	80 minims
Alcohol, ...	20 minims.

Rosenthal gives the preference to a solution in glycerin, as being of a non-irritating character. M. Chéron recommends injections of quinine hydrobromate (1 in 20 to 1 in 10) in the treatment of the morphine habit. M. Maximowitsch, of St. Petersburg, has given the *acid hydrobromate* in doses of from 2¼ to 3½ grains in several acute diseases.

Acid hydrobromate of quinine,	18 to 30 grains
Distilled water, . . .	up to 112 minims.

Warm and filter. The solution should be freshly prepared. With the rare exception of induration, this injection did not cause any local irritation.

The *basic sulpho-vinate of quinine* dissolves in 2 parts of water, forming, according to Dziewonski and Jaillard, a clear solution which keeps well.

Sulpho-vinate of quinine, . .	2½ grains
Distilled water, . . .	up to 16 minims.

Of 45 observations which he has collected, M. Dziewonski reports 4 cases of abscess, 2 in which sloughs formed, and a few in which injection was followed by induration. The basic sulpho-vinate of quinine has been used in intermittent fever by Messrs. Bourgeois, Pugens, Moret, Merz and Dardenne. M. C.

Paul administered acid sulpho-vinate of quinine in one case of intermittent fever.

The *carbolate of quinine* [this is not a true chemical salt. —R.], originally recommended by Bernatzik, has been used lately by M. Maestre Perez in the treatment of cholera:

Carbolate of quinine,	5 grains
Alcohol,	up to 16 minims.

Three injections are given one after the other, in the first stage of cholera.

The *formate of quinine* is fairly soluble; it has been used by Messrs. Namias, Lévi and Calza. The *quinate, tannate, valerianate*, and *lactate* of quinine have been tried, but we do not think them of sufficient importance to do more than mention them here. The *citrate of iron and quinine* has been used hypodermically by M. Rosenthal; it is extremely soluble in water. According to Prof. Eulenburg, Berg, of Dresden, recommends a green citrate of iron and quinine [the color, in this case being caused by the presence of ammonium citrate].

The *hydrochlorate of quinine and urea* [in continental phraseology often called *chininum hydrochloricum* or *muriaticum carbamidatum*], which is soluble in its own weight of water, has been injected in a 50-per-cent solution by M. Jaffé, 16 minims being equivalent to 5½ grains of the quinine salt. The local reaction is as a general rule trifling, neither redness nor puffiness being observable. In doses of 16 grains, hummings of the ears are frequently observed, but only in women.

Otto Saltzmann, of Breslau, used this salt in 10-per-cent solution—one syringeful at a dose. Its use was never followed by suppuration, and better results were obtained than by the internal administration of quinine.

In intermittent fevers its action has always been uniform, and the paroxysms have been arrested after 3 or 4 injections. In typhus the temperature falls considerably after the injection of two or three syringefuls.

The *hydrochlorate of quinine*, suggested by M. Binz, is richer in quinine than the sulphate, besides being more soluble, easier of absorption, and less liable to decomposition. It has been used hypodermically by Messrs. Bernatzik, Steinhaus, Galignani, and others, sometimes in watery solution, at others dissolved in glycerin or in ether (Winckel).

Hydrochlorate of quinine,	3 grains
Glycerin,	8 minims
Water,	up to 16 minims.

(*Kohn.*)

Four syringefuls, or 12 grains, at the commencement of a maniacal paroxysm, were administered without either local or general accidents, by taking the precaution to warm the solution and to give it in divided doses.

Hydrochlorate of quinine,	10 grains
Diluted hydrochloric acid,	8 minims
Distilled water,	up to 20 minims.

(*Bernatzik.*)

In the "Real-Encyclopædie," Bernatzik gives the formula thus:

Hydrochlorate of quinine,	10 grains
Diluted hydrochloric acid,	4 minims
Distilled water,	up to 20 minims.

Steinhaus' formula:

Hydrochlorate of quinine,	4 grains
Diluted hydrochloric acid,	q. s.
Distilled water,	up to 24 minims.

This solution produced ulceration and sloughing of the cellular tissue. Prof. Ziemssen gives the following prescription:

Hydrochlorate of quinine,	8 grains
Diluted hydrochloric acid,	2 minims
Distilled water,	up to 20 minims.

Therapeutic Uses.—Quinine has been used subcutaneously extensively and by many physicians in the treatment of intermittent fevers, in tubercular, intermittent, and in remittent fevers. In septicæmia, mania, neuralgia, cholera, and infantile cholera, typhoid fever, acute and chronic articular rheumatism, sunstroke, convulsions, hydrophobia and pyæmia.

In conclusion, injections of quinine salts should only be practised in cases of urgency, or when there is difficulty in administering it per os or per rectum.

[Dr. Smirnoff [41] reports the results obtained by the hypodermic use of quinine in the treatment of 470 malarial soldiers. The average number of injections required in each case was

2.5, the greatest number in an individual case being nine. Relapse was rarer after treatment by subcutaneous injection than after the internal administration of quinine. The hydrochlorate was the salt used, and it never gave rise to serious local troubles, such as abscess or sloughing, while the pain caused by injection was trifling. Dr. Aitken, of Rome, recommends a solution of the bisulphate, one grain of which dissolves readily in six minims of equal parts of pure glycerin and distilled water. To this solution, two per cent of pure carbolic acid must be added. Thirty minims of this solution (= 5 grains of bisulphate of quinine) may be injected at one time in severe malarial affections, and also in the treatment of hyperpyrexia. (See, for further remarks on the use of quinine hypodermically, the article on *Sodii Salicylas.*)—*Trans.*]

QUINOIDINA. CHINOIDINUM.

Quinoidine. Chinoidin.

This is a mixture of various cinchona alkaloids, partly such as exist naturally in the bark, but mostly of secondary amorphous bases produced from the former during the process of manufacture of the crystallizable alkaloids. [Since the manufacturing process has been changed by the abandonment of strong acids and alkalies and protracted heat, very little quinoidine is obtained as a by-product by the quinine manufacturers at the present time. Indeed, it is their object to prevent its formation entirely, as it is only produced at the expense of the more valuable alkaloids.—R.]

Quinoidine is easily soluble in acidulated water. Bernatzik has used amorphous quinine (quinoidine) in ethereal solution.

Prof. Eulenburg thinks, after investigations which he has made, that both the ethereal solution and the tincture of quinoidine should be set aside.

Quinoidine, ...	10 grains
Ether, ...	up to 32 or 44 minims.

Reduce by evaporation to 20 minims. This solution frequently produces abscess.

The *hydrochlorate of quinoidine* is soluble in an equal part of water and is readily absorbed. Mosler used it in hypertrophy of the spleen.

QUINOLINA.

Quinoline. Tartrate and Hydrochlorate of Quinoline.

[Quinoline is an artificially produced base or alkaloid, intimately related to quinine, cinchonine and other natural alkaloids. It is a liquid, forming with acids crystallizable salts.—R.] It is insoluble in water, soluble in alcohol, ether, chloroform, and benzol. The *tartrate* and *salicylate* are stable salts; the former is readily soluble in water, the latter dissolves in 80 parts of water, and in alcohol, ether, benzol, vaselin, glycerin, and fixed oils.

Chief Physiological Effects.—Marked fall of temperature (Donath, von Jaksch, Biach, and Loimann), diminution and irregularity of respiratory movements, gastric disorder (nausea and vomiting), noises in the ears, sensation of pressure on the nucha.

In poisonous doses: frequent respirations, diminution and finally loss of reflex excitability, total paralysis, and death (frequently with hyperæmia and œdema of the lungs). Quinoline and its salts possess antiseptic properties; it has been used as a substitute for quinine, but is not so employed now; it is, moreover, much more expensive than quinine. ["The tartrate of quinoline is soluble in water and has the taste of peppermint. [Tartrate of quinoline requires 80 parts of water for solution. Its taste rather resembles that of oil of bitter almonds, than that of peppermint.—R.] It lowers the temperature, prevents coagulation of the blood, and possesses remarkable antiseptic properties. Given by the mouth it acts like quinine, but without causing noises in the ears or giddiness." Dr. Donath; quoted in "London Medical Record," vol. xii., p. 161.—*Trans.*]

M. Hagens[42] used hypodermic injections of citrate of quinoline, without serious local disturbance, in 34 cases of intermittent fever.

Citrate of quinoline, ...	30 grains
Citric acid, ...	6 grains
Distilled water, . . .	up to 45 or 60 minims.

In 25 per cent of the cases the paroxysms ceased; in the others, there was one return in 55 per cent. The results from

internal administration were, immediate cure in 71 per cent, and one relapse in 28 per cent of the cases.

Local Effects.—The *tartrate, hydrochlorate,* and *citrate* of quinoline are the only salts used for hypodermic injections. Injections of the hydrochlorate, according to Von Jaksch, who has used it in doses of 3 grains, are painful and often followed by extensive infiltration of the cellular tissue. The tartrate is preferable for this purpose. The medium dose hypodermically for an adult is from 3 to 16 grains.

Therapeutic Uses.—The salts of quinoline have hitherto been used with varying and uncertain results in intermittent fever, neuralgia, typhoid fever, whooping cough, tuberculosis, pneumonia, erysipelas, and septicæmia.

Further researches into the action of these salts are required before pronouncing on their therapeutic value.

[Further information on quinoline, or chinoline salts, may be found in the "Lancet," vol. i., 1882, p. 324, and an excellent *resumé* of their nature and properties will be found in an article entitled "Recent Studies in Therapeutics. XII. Resorcine and its Allies," in the "British Medical Journal," vol. ii., 1881, p. 945. I have frequently used tartrate of chinoline, by internal administration, as an antipyretic in pneumonia and erysipelas. Its effects on the pulse, as tested by sphygmographic tracings, and on the temperature, closely resemble those which follow on the administration of kairine.—*Trans.*]

RESORCINUM.

Resorcin.

Resorcin is a derivative of benzol, is isomeric with hydroquinon and pyrocatechin, dissolves to almost any extent in water, and is also soluble in ether, alcohol, glycerin, and vaselin. It is insoluble in chloroform and carbon disulphide. Aqueous solutions when exposed to air and light soon acquire a brownish color, without appreciable alteration, according to the degree of concentration; their reaction is neutral.

Principal Physiological Effects.—Resorcin possesses the same properties as carbolic and salicylic acids; a one-per-cent solution prevents fermentation, and a one-and-a-half-per-cent solution prevents putrescence. Its poisonous properties are less than those of carbolic acid. Resorcin has been frequently

used of late in those numerous affections for which carbolic acid is prescribed. The dose for adults has generally been from 40 grains to ʒ ij. It is always desirable to commence with small doses.

Hippocrate Callias [43] says: "In doses of from 4 to 8 grains to every kilogramme of the animal's body weight, it produced tremor, clonic convulsions, and acceleration of pulse and respiration, all these symptoms disappearing in the course of an hour. Sensibility and consciousness were unaffected. Beginning with 8 grains for every kilogramme, severe vertigo and loss of consciousness supervened, sensibility was dulled, the convulsions became violent and frequent and were mostly localized to the anterior portion of the animal's body. The pupils were dilated, respiration and circulation were very much accelerated, but the temperature was not much affected. There was a return to the normal condition at the end of two hours.

"In doses of from 14 to 16 grains per kilogramme, death supervened in half an hour, preceded by the same symptoms, the limbs, however, being less affected, and there were tetanic spasms of the nuchal muscles. The temperature invariably rises gradually till, at the moment of death, it reaches 106° F."

According to M. Russo Giliberti, resorcin in medium doses of one grain per kilogramme produced in three quarters of an hour lowering of the temperature to the extent of nine-tenths of a degree C., a return to the original temperature taking place in two hours. In a dose of 2¾ grains there is a fall of 1.6° C., but this is a poisonous dose. Elimination of carbonic acid is only slightly influenced by this drug.

Resorcin brought into contact with albuminous substances or with egg albumen, causes immediate coagulation, forming an albuminate of resorcin. Slightly concentrated solutions are possessed of caustic properties, causing opacity, with white discoloration of the cellular and muscular tissues. In man, resorcin often produces noises in the ears and vertigo. Elimination is rapidly effected by the kidneys. For use either by deep or subcutaneous injections, the following formula may be used:

Resorcin, ...	5 to 20 grains
Distilled water, . . .	up to 112 minims.

16 minims = ⅔ to 3 grains.

These injections give rise to no local troubles.

In inveterate sciatica, intramuscular injections of resorcin, in a ten to twenty per cent solution, often produce a healthy local derivation. A five-per-cent solution has been used hypodermically, with success, by Messrs. Bogusch, Stibnewski, and Ugo Bassi. This strength of solution has also been used by Cattani without local or general ill results. He asserts that he has obtained by this method definite and rapid effects.

[Dr. Murrell found that a dose of ʒ ij. of resorcin administered in one dose to a young woman who was suffering from asthma, produced alarmingly toxic phenomena. "She was, in a few minutes, in a profuse perspiration from head to foot; there was complete loss of voluntary power and reflex action, the pulse at the radials was weak and thready, and the temperature in the axilla was only 94° F. Restoratives were applied, consciousness was soon restored, and the temperature gradually returned to the normal" ("Medical Times and Gazette," 1881, vol. ii., p. 486). Dr. Andrew first used hot baths as restoratives, but latterly he has had recourse to red wines, especially the good vintages of Bordeaux and Burgundy, and he has found that under the influence of these stimulants the toxic symptoms speedily vanish. Dr. Dujardin-Beaumetz, who was the first in France to use resorcin, has entirely discontinued its internal administration. In his work, "Les nouvelles médications," Paris, 1886, he says that he was led to abandon the use of resorcin in rheumatism and typhoid, not only on account of its powerlessness, but also on account of the toxic phenomena to which it gave rise. After quoting the experiments which he made in conjunction with Hippocrate Callias, referred to above, he says:—"While recognizing the fact that resorcin is not so poisonous as carbolic acid, I came to the conclusion that it was a dangerous remedy as an antipyretic, for I observed in patients suffering from typhoid fever who were treated by resorcin, the same depression of the vital powers, the same adynamia, and the same pulmonary congestion which I had previously seen in patients who had been treated by carbolic acid. I have therefore discontinued the use of this drug, and I believe that in Germany also, resorcin is seldom administered internally; nevertheless, for external application, in the treatment of unhealthy wounds, it is an invaluable remedy." In addition to the diseases mentioned by

the authors for which resorcin has been administered, it has been used in whooping cough by Dr. Moncorvo,[41] in the treatment of diarrhœa, by internal administration in combination with castor oil, and "in paroyxsmal colic accompanying cancerous, dysenteric, tuberculous, and other diseases of the intestinal tract, and insomnia. In every instance where resorcin is administered as a hypnotic it must be given in toxic doses."

See also for further information as to its therapeutic uses, "Neale's Digest," 1882, and Appendix, 1886.—*Trans.*]

SANGUIS.

BLOOD. (*See Injectiones Nutrientes Hypodermicæ.*)

SAPONINUM.

SAPONIN.

Saponin, which is a glucoside, is a proximate principle existing in many plants, for instance in the root of *Polygala Senega*, and is but little soluble in cold water. Prof. Eulenburg was induced by the researches of Messrs. Pelikan and Kohler to use it hypodermically, but without success. It was employed in two and five per cent solutions in sciatica, neuralgia, and in several cases of epilepsy with aura.

Saponin, ... 1 grain
Distilled water, ... up to 50 minims.
Five minims = $\frac{1}{10}$ of a grain.

Saponin, ... $1\frac{1}{2}$ grains
Distilled water, . . . up to 30 minims.
Five minims = $\frac{1}{4}$ of a grain.

Prof. Eulenburg says that the local ill effects (sharp pain, obstinate induration, and erysipelatous redness), and the general symptoms (rigors, nausea, vomiting, paresis, and headache) contra-indicate its use for therapeutic purposes.

SCILLAINUM and SCILLIPICRINUM.

SCILLAIN (OR SCILLITOXIN) and SCILLIPICRIN.

According to Jarmested, scillain (a glucoside extracted from squill) has the same action as digitalin when injected hypodermically. Scillipicrin, another glucoside extracted from

squill, has been injected subcutaneously by Dr. Fronmüller as a diuretic.

Scillipicrin, ...	1 grain
Distilled water, . .	up to 12 or 60 minims.

Dose.—$\frac{1}{3}$ to $\frac{1}{2}$ grain of the active principle.

SERUM.

(*See Injectiones Nutrientes Hypodermicæ.,*

SODII CHLORIDUM.

Chloride of Sodium.

The hypodermic injection of saline solutions causes sharp pains and is followed by induration, sometimes even by abscess.

Bertin and Gray state that when preceded by an injection of atropine sulphate, the solution of salt does not cause pain.

Injections of salt solutions are mostly used in the treatment of neuralgia, sciatica, lumbago, angina pectoris, torticollis, and muscular spasms. M. Lubanski, of Nice, has administered them in the diarrhœa of phthisis to aid appetite and digestion; he never saw local accidents result. A 1 in 20 solution of chloride of sodium has been used for hypodermic transfusions (see sections on Nutrient Injections, and Sodium Sulphate).

SODII IODIDUM.

Iodide of Sodium.

M. Arcari has used this salt hypodermically. The dose required by this method is one third of that required in administration by the mouth, and it does not produce any local trouble (see Potassii Iodidum).

SODII LACTAS.

Lactate of Sodium.

Lactate of sodium, which was proposed by M. Preyer for use as a hypnotic, in doses ranging to upward of four drachms, has been used subcutaneously in doses of nine grains. No hypnotism was induced, and the point of injection was the

seat of intense pain. The experiments made by M. Bötticher in the clinique of Prof. Nothnagel, show that this salt is at best but a feeble and uncertain hypnotic.

SODII SALICYLAS.

Salicylate of Sodium.

Salicylate of sodium is freely soluble in water.

Principal Physiological Effects.—Buchholtz, Binz, Domingos, and Freire assert that salicylate of sodium arrests fermentation and prevents putrescence, but Kolbe and others deny this action. It causes slowing both of the circulation and of respiration, and lowers the temperature and blood pressure. *In large doses* it causes copious perspiration, nausea, vomiting, and tinnitus aurium. *In poisonous doses* it causes convulsions and asphyxia from paralysis of the respiratory centre. *Elimination* is effected by the kidneys.

It must not be forgotten that salicylate of sodium is contra-indicated in alcoholism, cerebral lesions, cardiac adynamia and renal diseases.

Local Effects.—According to Messrs. Domingos and Freire, with the exception of ecchymosis, local troubles are very rare if the drug is sufficiently diluted. Hence, when it is desirable to inject a large dose, this must be done by means of several punctures. M. Collard, of Liége, who has used salicylate of sodium hypodermically in typhoid fever, had to discontinue its use owing to the local injury to which it gave rise. These authors have recommended hypodermic injections of salicylate of sodium in yellow fever in doses of 16 and 24 grains and upward in the first, and of 1½, 2, and 3 grains, in the second stage.

Salicylate of sodium,	4 grains
Distilled water,	up to 16 minims.

Salicylate of sodium should be absolutely neutral, and the solution should be made, and filtered, only when required. The solution which has been used by Dr. Dujardin-Beaumetz and others produces neither pain nor local ill effects. Caffeine is associated in it with the sodium salicylate.

Caffeine,	16 grains
Salicylate of sodium,	12 grains
Distilled water,	up to 32 minims.

[In connection with the subject of hypodermic injections of quinine, salicylic acid, and salicylate of sodium as antithermic agents, it may not be very much out of place to supplement the observations in "The Manual" by some remarks on this subject by recent authors. In the first place it should be observed that in cases of pyrexia, not dependent on malarious influences, quinine is, as a general rule, not available by hypodermic injection, for this reason that, as Dr. Lauder Brunton points out, large doses (from five to twenty grains) are required to produce an antipyretic effect, and that it is more effectual in this way when given in one, or at the most, two doses per diem. The difficulty of doing this without producing serious local inconvenience at the point of injection is self-apparent.

Dr. Dujardin-Beaumetz[46] says that, except in the case of malarial affections, the salts of quinine are inferior in antithermic power to other drugs, and that to obtain appreciable effects in pyrexia it is necessary to administer them in gramme (15 grain) doses, which, he adds, are fraught with danger to the heart and brain, as well as to other organs. There is, however, one condition of pyrexia in which Professor Jaccoud has obtained most encouraging results, that, namely, which characterizes the period of excavation in ordinary phthisis ("fièvre d'ulceration ou d'excavation"). The plan adopted by this author is to administer the first day, at intervals of ten minutes, four capsules containing each seven and a half grains of hydrobromate of quinine: the patient takes in this way ʒ ss. in half an hour. If the temperature compared with that of the previous evening does not fall a degree, he administers twenty-two grains, in the same way, on the second evening; then on the third day, even if the evening temperature does not exceed that of the morning, two doses of seven or eight grains each are given, with an interval of ten minutes between them. After this there is an interval of two days, after which, if necessary, the same method is resumed. If, for any reason, this plan is inadmissible, Prof. Jaccoud substitutes for it the following: 15 grains of quinine hydrobromate are dissolved in 80 minims of distilled water; 16 minims of this solution, or a Pravaz syringeful (= 3 grains of the quinine salt), are injected. This dose is equivalent to 7½ grains per os. Hence two injections = 15 grains, four injections = 30 grains,

and so on. Proceeding according to this method, three injections are made the first day, two the second, and one the third; then comes an interval of two days, after which the same routine is followed. "These injections," Prof. Jaccoud adds, "are not more painful than morphine injections; they give rise to no serious trouble, provided only that they are made into the subcutaneous cellular tissue, and not merely into the deep layer of the derma; sloughing, abscess, erysipelas, or glandular enlargement never results, as I can assert after a large experience; an erythematous redness develops round the point of puncture, which rarely extends beyond the size of a five-franc piece, and which disappears in two or three days; but it must be remembered that a hard indolent nodosity remains, which adheres to the deep surface of the skin, and that this induration, which entails no further inconvenience, persists for at least from six weeks to two months." (See also some remarks by Prof. Nothnagel on the use of quinine as an antipyretic, and especially on its abuse, in the "Medical Times and Gazette," 1884, vol. ii., p. 797.) In the fever due to re-absorption of the products of softening and excavations in phthisis, Prof. Jaccoud recommends salicylic acid or salicylate of sodium. If the stomach is tolerant of the former drug, it is administered in its natural condition in capsules containing eight grains; if neither salicylic acid nor salicylate of sodium is well borne by the stomach, the latter drug is administered hypodermically, six grains of the salt being injected into each arm. In this way a fall of temperature was obtained equal to that obtained by one drachm of salicylic acid, but the antipyretic affect was generally delayed to the day succeeding the injection.—*Trans.*]

SODII SULPHAS.

Sulphate of Sodium.

Gubler was the first to use this salt hypodermically, but without producing purgation: it was subsequently used by Luton (1½ grains in 16 minims of water) with slight laxative effects.

Sulphate of sodium, . . . 10½ grains
Distilled water, . . . up to 112 minims.
16 minims = 1½ grains.

The use of sulphate of sodium hypodermically has been recommended by M. Luton in the different forms of vomiting and in cholera. He uses a syringe with a capacity of 5 grammes (80 minims). The injections should be made deeply and in regions well supplied with subcutaneous cellular tissue. He uses a 1 in 10 solution.

Hiller ("Ueber die subcutane Anwendung von Abführmitteln."—"Zeitsch. f. klin. Med.," Berlin, 1882, pp. 481, 497) has experimented with a large number of purgatives by the hypodermic method, among which may be mentioned aloin and colocynthin, which produced serous stools, in from 4 to 6 hours, and intense local pain (a 1-in-10 solution was used), citrullin, the extract of colocynth, elaterin, the cathartic acid of senna, leptandrin, euonymin, baptisin, etc. This writer, as a result of his experiments, concludes that there is no advantage to be gained by the administration of purgatives hypodermically, and that this method should only be adopted in those cases in which internal administration is impossible.

In some cases, especially in athrepsia, M. Luton recommends either sulphate of sodium or the following solution:

Sulphate of sodium, ...	10½ grains
Phosphate of sodium, . . .	5 grains
Distilled water, . . .	up to 112 minims.

Minimum dose, 80 minims administered once a week.

SOLANINE.

[Although the existence of this alkaloid has been known since 1821, its therapeutic properties have only recently been studied, and it is to Dr. Geneuil that we are chiefly indebted for a knowledge of its actions. It is obtained from potato shoots and also from the parings of very young or very old potatoes. Solanine belongs to the same class of poisons as atropine, physostigmine, and pilocarpine, its first physiological effect being to paralyze the nerve-terminals of non-striated muscular fibre. The alkaloid solanine is crystallizable, insoluble in water, slightly soluble in ether, and readily so in hot alcohol. It forms salts with acids. The hydrochlorate of solanine, which is a gelatinous body, readily soluble in water, may be given in doses ranging from one to three or four grains daily. In some cases Dr. Geneuil does not hesitate to

give as much as eight grains daily. He regards it as a narcotic to the medulla, spinal cord, and nerve-trunks, and as a paralysant to the terminal ends of sensory and motor nerves. It does not produce cerebral congestion, but in poisonous doses it is said to affect the cerebral cortex, causing headache, delirium, cyanosis, and somnolence.

The drug is best administered hypodermically, as it is apt, when administered by the mouth, to cause nausea, vomiting, and a desire to defecate.

Solanine does not produce the unpleasant after-effects which are apt to follow the administration of morphine and atropine, and it has no cumulative action.

Therapeutics.—Solanine may be prescribed to combat excitement, spasm, and pain. It has produced excellent results in the treatment of sciatica and rheumatic neuralgia, and it has proved of service in the treatment of gastritis, acute dyspepsia, the vomiting of pregnancy, bronchitis, bronchial asthma, cardiac asthma, and emphysema. It has been used in cystitis, prurigo, and in some nervous affections in which restlessness and insomnia were prominent symptoms.

It may safely be prescribed for young children and old persons.[47]—*Trans.*]

SPARTEINE.

Sparteine is an oily, fluid alkaloid, extracted from *Cytisus Scoparius* (Leguminosæ — Papilionaceæ), the shoots of which contain besides another principle, scoparin. These two principles have been extracted by M. Merck (see "Chemiker-Zeitung," iii., 1879, p. 380). Scoparin, a yellow powder, in which crystalline needles can be distinguished by the aid of the microscope, is sparingly soluble in water and readily so in alcohol and glycerin. It has feebly acid properties. It has been administered hypodermically in ½-grain doses as a diuretic.

Scoparin, ...	6 grains
Glycerin, ...	30 minims
Distilled water, ...	up to 96 minims.

Eight minims = ½ a grain.

The salts of sparteine are crystallizable. The decoction of the shoots, of a brownish or orange-red color, possesses purga-

tive, diuretic, and slightly narcotic properties. The physiological properties of sparteine closely resemble, according to Messrs. Nothnagel and Rossbach, those of coniine. (See also an essay by Rymon, Paris, 1880.)

Sulphate of sparteine, . . .	2 grains
Distilled water, ...	112 minims.

(*Fronmüller sen.*)

The diuretic effects appear after doses of $\frac{2}{7}$ of a grain (16 minims of solution).

STRYCHNINA.

Strychnine and its Salts.

Strychnine is obtained from *Nux vomica* and *St. Ignatius bean.* The bark of the *Strychnos Treuté* and of the hoangnan also contains strychnine. It is very sparingly soluble in water, alcohol, and ether. Its salts are all soluble in water and are more rapidly poisonous than the pure alkaloid. The hydrochlorate and the nitrate are more active than the sulphate, as the latter contains much water of crystallization.

Chief Physiological Actions.—Increase of tactile sensibility, tinglings, salivation, anxiety, vertigo, rapid breathing, stiffness of the nuchal muscles, tetanic spasms in rapid succession, merging into one another, with opisthotonos and forcible extension of the lower limbs and of the trunk, trismus (from the action of the poison on the bulb and spinal marrow), dilatation of the pupils, elevation of blood pressure, abolition of energy of the motor nerves, slowing of cardiac pulsations, death by asphyxia, arrest of the heart, and unascertained modifications of the nerve centres. Strychnine is also possessed of decided antiputrescent and antifermentative properties. The cumulative action of strychnine is generally admitted; Leube and Rosenthal assert that habituation can be acquired by prolonged use.

Local Effects.—Sulphate of strychnine does not cause any local trouble, and the same thing is true of the nitrate. Erection of the hair-follicles (goose-skin) has been observed at the point of puncture.

Dose.—According to Husemann, the minimum lethal dose is $\frac{1}{2}$ of a grain. It should at first be administered in very mi-

nute doses—from $\frac{1}{140}$ to $\frac{1}{10}$ of a grain, cautiously increased until the appearance of certain toxic phenomena (stiffness of muscles of neck, spasms, etc.), when the administration must be suspended.

Antagonisms.—Calabar bean (Watson and Keyworth), chloroform inhalations (?), and chloral (Liebreich, Rajewsky). A pseudo-antagonism exists between strychnine and curarine.

[Urethane is alleged by Prof. Anrep to be nearly as efficient and much less dangerous an antagonist than chloral. Dr. Bignon (of Lima) concludes, from experiments made upon dogs, that cocaine is a physiological antagonist to strychnine. Up to a certain point after the ingestion of poisonous doses of strychnine, the animal could always be saved by hypodermic injections of cocaine, but when too large doses of strychnine were administered, it always perished from the correspondingly large doses of cocaine required.[48]—*Trans.*]

Nitrate of strychnine, ... $\frac{1}{2}$ grain
Distilled water, . . . up to 112 minims.
Eight minims = $\frac{1}{28}$ of a grain.

Sulphate of strychnine, ... 1 grain
Distilled water, . . . up to 288 minims.
Sixteen minims = $\frac{1}{18}$ of a grain.
Four minims = $\frac{1}{72}$ of a grain.
(*Bartholow.*)

Sulphate of strychnine, . . . 3 grains
Distilled water, . . . up to 336 minims.

Eight minims (= $\frac{1}{14}$ of a grain) to be injected, *in divided doses,* round the anus, every two days, in the rectal prolapse of children. (*Dolbeau.*)

Nux vomica and strychnine have been recommended by Luton and others in the treatment of delirium tremens:

Sulphate of strychnine, ... 1 grain
Cherry-laurel water, ... 112 minims
Distilled water, . . . up to 224 minims.

Sixteen minims = $\frac{1}{14}$ of a grain. An injection every half-hour till four have been given, after that every hour. (Luton says the dose should reach $\frac{8}{4}$ to $\frac{4}{4}$ of a grain of strychnine sulphate.)

Tincture of nux vomica has been used hypodermically by M. Luton in threatened asphyxia from catarrh, in the death agony, and in the last stage of conditions of adynamia in doses of as much as 80 minims. As to the local effects, this writer has observed slight swelling, heat, and a moderate degree of pain, all of these symptoms disappearing in an hour or two.

Therapeutic Uses.—Paralysis of the vocal cords, of the crico-thyroid muscles (Waldenburg, Neudorfer), saturnine palsy (Lorent), rectal prolapse in children (Wood, Foucher, Dolbeau, Büdder, Lorent, Gualla, Heusch). Guersant and Giraldès never obtained any benefit from its use.

In various forms of paralysis, such as hemiplegia, paraplegia, paralysis from compression of the radial nerve, Bell's paralysis (in Bell's paralysis M. Courty injected hypodermically, with success, from 6 to 12 minims of a 1 or 2 per cent solution every second or third day), hemeralopia, amaurosis, writer's cramp, urinary incontinence, the lightning pains of tabes, sciatica, pulmonary emphysema, cholera, chloral poisoning, diphtheritic paralysis, infantile paralysis, progressive muscular atrophy, and locomotor ataxy

Maestro Perez has recommended injections of 4 to 5 minims of a 2-per-cent solution in the second stage of cholera.

[I have thought it desirable in this, as well as in a few other places, to omit a long list of names of writers who have used the remedy in the various diseases named, chiefly because the authorities quoted are not readily accessible to English readers.

Atropine has been used to antagonize the poisonous effects of strychnine. In the "British Medical Journal" (vol. i., 1880, p. 671) two cases of strychnine poisoning successfully treated by atropine by Dr. Roberts are quoted from the "Philadelphia Medical Times." In one of these cases the strychnine had been administered in whiskey, and Dr. Roberts found that after the exhibition of ten minims of this solution in a cat, the poisonous symptoms, which were produced within five minutes, were overcome by giving atropine in powder by the mouth.

Gubler ("Commentaires du Codex," 2d edit., p. 761) says that *possibly* atropine is antagonistic to strychnine, but Bartholow ("Hypodermatic Medication," 4th edit., p. 258) strongly combats this view and asserts that atropine intensifies the

effects of strychnine, and hastens death "by contributing to the tetanic fixation of the muscles of respiration." This opinion is confirmed by McReddie ("British Medical Journal," vol. i., 1883, p. 973) who, after experimenting on dogs, found that atropine, as well as chloroform, amyl nitrite, and eserine, neither prevented the fatal result nor arrested the convulsions. McReddie's results as regards the antagonism between strychnine and amyl nitrite are probably fallacious; they are contradicted by the experimental researches of the late St. Clair Gray, of Glasgow ("Glasgow Medical Journal," 1871, p. 188), and by the clinical experience of Dr. Barnes ("British Medical Journal," 1882, vol. i., p. 458) in a case of accidental poisoning by strychnine. Dr. H. A. Hare, of Boston (quoted in "London Medical Record," vol. xiii., p. 75) finds that nitrite of amyl does prolong life in strychnine poisoning, but that its action is so fleeting that it can be only used to tide over the patient until other more persistent remedies can be administered. He recommends an injection in the first instance, the effect being then kept up by means of inhalations.

Physostigma has been used as an antidote. Dr. White, of Glasgow, used it successfully in a case of strychnine poisoning, but chloroform inhalations were used simultaneously ("Glasgow Medical Journal," 1871, p. 488). Dr. Byrne, of Russelville, Ky., records a case of recovery after a dose of ten grains of strychnine had been taken, three doses of 4 minims each of extract of calabar bean having been administered, but in this case also it is impossible to say how far the physostigma contributed to the successful result, as ipecacuanha, chloral, and chloroform had also been administered ("Lancet," vol. ii., 1882, p. 1105). Dr. Fothergill has shown that strychnine is an antidote to aconitine.

Strychnine administered hypodermically has been found of the greatest value in cases of cardiac failure. The experiments of Lauder Brunton and Cash show that this drug stimulates the motor ganglia of the heart, and the former authority states that "the action of strychnine on the motor centre in the heart is probably similar to its action on the vasomotor and respiratory centres."

Dr. Herbert Habershon points out that in this respect strychnine differs from alcohol, ether, ammonia, and digitalis, which are to a large extent muscle stimulants. Hence in

some cases strychnine will succeed when other stimulants have failed. He recommends the hypodermic use of strychnine in the following classes of cases:

"(1) In many cases where the feebleness of the heart's action depends primarily upon an acute lung affection, such for instance, as in some cases of acute pneumonia, or a case of renal disease in which a sudden œdema of the lung supervenes, accompanied by rapid and feeble action of the heart. In these the double action of strychnine on heart and lungs alike renders it of especial value. (2) In cases of cardiac disease where, by the primary affection of the heart, the arterial system is unfilled, the great nerve centres in the brain suffer from a want of nutrition, and are, so to speak, starved. (3) In a third class of cases the feeble action is due to a reflex cause (also in the course of cardiac disease); for instance, 'shock' produced by exhaustion, by a local cause, such as embolus in the brain, by extreme cold, or emotional excitement or fright."

Strychnine hypodermically has been recommended and used in threatened failure of respiration occurring in opium poisoning, but I have been unable to find the reference.—*Trans.*]

STRYCHNINÆ ARSENIAS.

Arseniate of Strychnine.

[A new remedy introduced and clinically tested by Russel, for which it is claimed that it posesses the properties both of arsenic and strychnine in combination. The preparation is readily soluble in glycerin and water, and as it is easy of absorption and produces no local disturbance when given subcutaneously, it is well adapted for that purpose.

Arseniate of strychnine, . . .	1 grain
Glycerin,	
Distilled water equal parts,	up to 256 minims.

Dose.—Should begin with 4 minims, gradually increased to 8 and then to 16 minims = $\frac{1}{64}$, $\frac{1}{32}$ and $\frac{1}{16}$ grain respectively).

Therapeutics.—Arseniate of strychnine possesses powerful antiseptic properties, in virtue of which it is of the highest value in the early stages (prodromata) of acute infectious dis-

eases. When administered in the initial stage of infectious fevers, it overcomes the symptoms of general malaise, muscular lassitude, etc., and the patient experiences relief even after a single injection. Dr. Russel has found the drug of special use in the treatment of typhoid fever, which disease, he asserts, it aborts in the early stages, or simplifies, when administered after the fever is fully developed; and he attributes these effects to the power which the remedy possesses of "sterilizing, as it were, the soil on which the pathogenetic micro-organisms of typhoid fever vegetate." [49]—*Trans.*]

TAYUYA.

Tayuya.

Tayuya, which is obtained from the root of the *Dermophylla pendulina* (Cucurbitaceæ), has been introduced into medical practice by M. Ubicini, of Pavia. The Italian physicians use it as a bitter tonic and ascribe to it anti-syphilitic and anti-scrofulous properties. In scrofula and syphilis they appear to have obtained almost magical results from the use of this drug. Messrs. Ambrosoli, of Milan, and Gamberini, of Bologna, used tincture of tayuya hypodermically. The former injected it pure in doses of sixteen minims in 3 cases of constitutional syphilis, and observed only a very trifling local reaction. In 2 cases, 1 injection (!!) sufficed to effect a cure; in the third case the injection was repeated in 8 days, after which recovery was complete (!).

Professor Gamberini began with injections of the tincture diluted with half its bulk of water, and then used injections of undiluted tincture; a dose of 16 minims was well borne, but it gave rise to a hard indolent swelling. Many other Italian physicians, following these observers, have used tayuya and frequently with the same success, especially in scrofula. Dr. Eulenburg, who has experimented with the tincture of tayuya of M. Ubicini has not found any real benefit result from its use in full doses; Messrs. Geber, who used it internally and subcutaneously with comparative success, slight syphilitic eruptions yielding under its influence, Concetti, Pelizarri, Maracci, Zanarelli, Rasoir and Zeissl obtained similar negative results, while Prof. Sigmund, of Vienna, found that tayuya was not only inefficacious but positively injurious.

THALLINA.

Thalline.

Thalline is a derivative of quinoline. The name of thalline has been given to this substance on account of the green color which it produces on contact with perchloride of iron. It was discovered by Skraup and was first used by Jaksch, of Vienna. All the salts of thalline, the tartrate, sulphate, hydrochlorate and acetate, dissolve readily in water, but the solution gradually becomes dark. For this reason, solutions of thalline salts should be made freshly when wanted. The sulphate, which is generally used for therapeutic purposes, dissolves in 7 times its weight, and the tartrate in 10 times its weight of cold water. Solutions of thalline have a bitter, saline taste, and a peculiar aromatic flavor.

Jaksch was the first to discover the antipyretic properties of thalline. He used the hydrochlorate, sulphate, and acetate of thalline, in doses of 3½, 7 and 10½ grains. The fall of temperature was considerable, amounting to several degrees, but he frequently observed sweats coincidently with the fall of temperature, succeeded by rigors and an ultimate rise of temperature. Collapse never occurred. There have also been observed increase of blood-pressure (Pisenti), and a fall in the pulse and respiration. The minimum of temperature was reached in from 2 to 3 hours after exhibition of the drug, which, further than this, exercised no influence on the progress and duration of the various diseases for which it was prescribed.

The effects produced by thalline last longer than those obtained from kairine; it is more active than antipyrine (3½ grains of the former = 16 grains of the latter), but the effects of antipyrine last longer. In doses of 8 to 12 grains the salts of thalline did not produce any toxic phenomena in rabbits, and doses of 7 grains did not produce any symptoms in a healthy man. All the salts of thalline arrest fermentation. According to Jaksch, elimination is effected by the kidneys. Messrs. Brouardel and P. Loye have demonstrated that thalline has the same *modus operandi* as kairine, that it acts, namely, by destruction of the hæmoglobin.

Dr. Alexander has experimented in the clinic of Dr. Biermer

with the sulphate and tartrate of thalline, and has obtained results identical with those of Jaksch. With a dose of 4 grains the effect lasted, on an average, only two hours, hence it was necessary in order to obtain a constant effect to repeat the dose of the drug every two hours. M. Grocco, of Pavia, has used *acetate of thalline,* which he found was a powerful antipyretic in doses of 4 grains. The symptoms observed after its use were profuse sweats, and diminution in the frequency of the pulse and respirations. In some cases where there was intolerance of the drug, he administered it without inconvenience by the hypodermic method in doses of 1½ grains. The average duration of the action of this salt varied between four and six hours.

M. Mingazzini has used the *sulphate* and *tartrate* of thalline. He has moreover used the following solution hypodermically.

Sulphate of thalline, ...	3 grains
Distilled water, ...	up to 16 minims.

As there is a precipitate from this solution in the cold, it is necessary always to use it warm. This solution did not cause abscess or other local accidents. In a dose of 1½ grains, which is equivalent to 4 grains administered per os, the lowering of the temperature reached 2.1° to 2.3° C. and persisted for a period of six to nine hours.

M. Pisenti also states that solutions of sulphate of thalline in water used hypodermically are perfectly safe.

Thalline has this advantage over antipyrine, that the dose required is much smaller, and that it but rarely induces vomiting. Antipyrine, on the other hand, produces effects which last longer, as a rule does not cause rigors, lowers the pulse rate as well as the temperature, and finally, according to certain writers, it exerts a favorable influence on the joints in acute articular rheumatism.

[For further information on the value of thalline as an antipyretic, see papers in the "Practitioner," vol. xxxv., p. 222, and vol. xxxvi., p. 256; "London Medical Record," vol. xiii., p. 455; "British Medical Journal," 1886, vol. i., pp. 83 and 608.

Professor Ehrlich and Dr. Laquer treated sixteen cases of typhoid fever with doses of thalline, ranging from ½ to 1¼ grains every half-hour or hour. In all the cases the temperature was

reduced to the normal standard in from four to five days, on an average. The dose which suits an individual case having been ascertained, it may be administered at frequent intervals without risk. These authors regard thalline as a specific in typhoid fever. Jannsen found this drug much inferior in therapeutic value to quinine in malarial fever, but of great service in phthisis, as very small doses sufficed to control the fever. Dr. Ewald ("Medical Record," loc. cit.) says of thalline, kairine, and antipyrine—"they are by no means antipyretic remedies in the sense that they possess the power of reducing the temperature itself, *i.e.*, the increased oxidation which causes the rising of the temperature, and manifests itself by the measurable temperature of the surface of the body; they are merely antithermic remedies. Their action may be compared with the effect of opening the windows of an overheated room. The temperature will sink near the window but will increase in proportion as we approach the fireplace, where the heat will remain unaltered. The same is the action of these remedies; they induce an increased radiation of heat to the surrounding media, probably by dilatation of the blood-vessels, but they have no influence whatever on increased oxidation and on the pathological process itself. The blood nearer to the focus of the inflammation will receive heat, and give it off again on the surface of the body. This explains why, on discontinuing the remedy, such immediate and rapid rising of the temperature will take place, which is not the case with the genuine febrifuge medicines, such as quinine, the action of which is more permanent."

Professor Jaccoud reports most favorably of the value of thalline as an antipyretic. In the "Gazette des Hôpitaux," he gives the results obtained from its use in the treatment of typhoid fever, the fever of tuberculosis, pneumonia, and erysipelas. He considers thalline to be the most valuable antipyretic agent we possess, and he states that by its systematic use, in small doses, it is possible to maintain a permanent condition of apyrexia in febrile cases. (A short extract from this paper may be found in the "Bristol Medico-Chirurgical Journal," vol. iii.)—*Trans.*]

THEBAINA.

Thebaine.

Thebaine has been used hypodermically in the treatment of neuralgia by Prof. Eulenburg, who found that it caused severe smarting pain at the point of puncture, and by M. Waldemar, of St. Petersburg.

TRANSFUSIO HYPODERMICA.

Hypodermic Transfusion.

(*See Nutrient Injections, Sulphate and Chloride of Sodium.*)

URETHANUM.

Urethane.

[Urethane occurs in the form of white crystals, is free from odor, has no disagreeable taste, and is freely soluble in water. It is the ethylic ether of carbamic acid, and its chemical composition is represented by the formula $C_3H_7NO_2$.

Von Jaksch, of Vienna, considers that this drug is peculiarly suited for administration to children. It is most useful in simple uncomplicated insomnia, but it is apt to prove ineffectual when there is acute pain.

Although as much as 30 to 60 grains may safely be given to adults, Dr. Saundby has obtained good results from the exhibition of two-grain doses in cases of cardiac insomnia. Mr. Jackman used urethane, in 4-grain doses every 2 hours, with success in a case of tetanus, after chloral, given in 20-grain doses every 3 hours, had failed to do more than relieve the pain. Dr. Sprimon, of Moscow, verified the statements of Jaksch by experiments on himself, patients, and animals (rabbits and cats). He found that hypodermic injections were painless, even when 16 grains were introduced (in an experiment on himself).

Dr. Savage administers it in cases of insanity in doses of five grains hypodermically, or one to two drachms by the mouth.—*Trans.*]

VALDIVINE.

This principle has been obtained by M. Tanret from the seeds of the *Simaba Valdivia* (Simarubaceæ), a tree indige-

nous in Columbia. [This principle is so little used that it is not even to be found on the lists of Merck and other manufacturers of alkaloids.—R.] It is very sparingly soluble in water (1 in 600 parts), is soluble in alcohol (1 in 60 parts), less so in absolute alcohol (1 in 190 parts), dissolves readily in chloroform, but is insoluble in ether.

Valdivine has very pronounced poisonous properties; it produces death in rabbits in doses of $\frac{1}{34}$ to $\frac{1}{17}$ of a grain according to the size of the animal, but it must be observed that its effects are very slow in developing. During the first four or five hours the animal appears to be as well as before administration; there are often observed, however, especially after very large doses, a rise of temperature and an increase in the number of the heart beats. M. Restrepo, from whom we derive all our information, has noticed vomiting as well, in the dog and man, after a dose of $\frac{1}{17}$ of a grain. The physiological researches of this author are still incomplete, and valdivine requires further investigations.

The dose administered to man has never exceeded $\frac{1}{17}$ of a grain. Locally we find that sometimes "there is slight puffiness at the points of puncture."

Valdivine, ... 1 grain
Distilled water, . up to 1 ounce 80 minims.
16 minims = $\frac{1}{35}$ of a grain.

Drs. Restrepo and Dujardin-Beaumetz have administered it unsuccessfully in intermittent fevers, and experiments made with it at the *Jardin des plantes* in the bites of venomous serpents (Crotalus adamanteus and durissus) have also been without result.

M. Nocard has experimented with valdivine in rabbits which had contracted dumb rabies. It appears that no further result was obtained than a sedative action in the most severe cases.

VASELIN.

[M. Mennier, of Lyons, considers that vaselin diffuses itself very rapidly through the body, its diffusibility varying inversely with its consistence, and he states that antiseptics combined with it as a vehicle give rise to no local pain or reaction when injected hypodermically. It is essential, how-

ever, that the vaselin should be absolutely pure. The best test for impurity is warm sulphuric acid, which does not blacken pure vaselin.

Eucalyptol and turpentine have thus been injected, the former in phthisis, the latter in sciatica, according to the following formulæ:

Eucalyptol, ...	5 parts
Vaselin, ...	20 parts.
	(By weight.)

From fifteen minims to three drachms to be injected daily into the outer part of the thigh.

Berthelot's turpentine, . . .	75 minims
Vaselin, ...	5 drachms

Dose.—From ♏ xv. to ʒ iiss. daily.

["Berthelot's turpentine" is not known in the U. S.—R.]

Iodoform, carbolic acid, iodine, and camphor may in this form be injected in the strength of one per cent, thymol in half per cent, and menthol in ten per cent.[50]—*Trans.*]

VERATRINA.

Veratrine.

Veratrine is obtained from the seeds of the *Sabadilla officinarum.* [*Veratrum album* L. and *Veratrum viride* Aiton, which the authors of the original quote as sources of veratrine, do *not* contain veratrine, but other alkaloids, chiefly jervine.—R.] It is insoluble in water, but dissolves in alcohol and ether. All its salts, and especially the nitrate, are soluble in water.

Doses of $\frac{1}{14}$ to $\frac{1}{4}$ of a grain suffice to produce decidedly toxic phenomena in all species of animals, man included.

Chief Physiological Effects.—It is an antipyretic. When administered by the mouth, it produces a sensation first of heat and then of burning, nausea, vomiting, colic, diarrhœa, tinglings in the limbs; the respiratory movements become infrequent and painful, the pulse, which in the first place is accelerated, becomes slow and irregular. The temperature falls, there are intense headache, involuntary muscular contractions, collapse and fainting with pupillary dilatation. Saliva-

tion and emesis are the two most constant symptoms. Linon states that the exhibition of veratrine may be persisted in despite the vomiting in cases in which the antipyretic effect has not been attained, as this effect is generally produced only after emesis. The fall in the pulse-rate always precedes the fall in temperature. Its action appears in from two to three hours after administration, and it does not accumulate in the system.

Veratrine, ...	1 grain
Diluted alcohol, ...	72 minims
Distilled water, . . .	up to 144 minims.

Two to six minims of this solution are equivalent to $\frac{1}{72}$ to $\frac{1}{24}$ of a grain of veratrine.

Therapeutic Uses.—Pneumonia (it must not be forgotten that pneumonia does not admit of vague general treatment) and neuralgia (Lorent), neuralgic and rheumatoid pains (Bois), rheumatism (Eulenburg and Hiffelsheim), toothache and neuralgic rheumatism (Erlenmeyer used it in this latter affection without benefit), continued fevers and symptomatic fever (Eulenburg and Seitz).

Prof. Eulenburg observed abscess after the injection of an alcoholic solution, 1 part in 250; and afterward he used the same strength of solution prepared with equal parts of water and alcohol. Messrs. Lorent, Erlenmeyer, Hiffelsheim, and Eulenburg were all obliged to abandon its use hypodermically owing to its local irritant effects.

M. Bois made use of a 1-per-cent aqueous solution of veratrine nitrate; he injected doses of $\frac{1}{144}$ to $\frac{1}{70}$ of a grain with success. But, he adds, "the contact of the solution with the tissues produced such intolerable pain that the remedy was found to be worse than the disease, otherwise it gave rise to no local disturbance." M. Linon in his essay (Strasburg, 1868) states that he has seen the tincture [meaning that of veratrum viride, which, however, contains *no* veratrine.—R.] administered both per os and hypodermically.

M. Hepp had prepared it by dissolving the resinous extract in alcohol of 56%, in the proportion of $5\frac{1}{2}$ grains of veratrum to 160 minims of alcohol. The same author adds, a few pages further on, that this solution produced a phlegmonous abscess at the point of puncture, and that M. Hepp purposed trying a

solution of the resinous extract in glycerin, in the hope that this solution would be less irritating. Veratrine has been used by Messrs. Cagny and Leblanc in veterinary medicine (45 to 90 minims of a 1-in-25 alcoholic solution, in the horse ("Congrès de Blois," 1884).

ZINCI CHLORIDUM.

Chloride of Zinc.

M. Luton has used a 1-in-50 solution of chloride of zinc in various forms of neuralgiæ, among others in sciatica (loc. cit., p. 112).

ZINCI SULPHAS.

Sulphate of Zinc.

Sulphate of zinc has been administered hypodermically by M. Wyschinski in dilute solution in the treatment of obstinate dyspepsia.

BIBLIOGRAPHY.

1. Traité technique d'histologie, p. 425.—2. See also, Ranvier (work quoted under 1), p. 656.—3. Nikitin, Inaug. Dissert., Würzburg, 1878: Ueber die physiol. Wirkung und therap. Verwertung des sclerotinsauren Natriums und des Mutterkorns. Pharmakologische Untersuchungen (Rossbach), Bd. ii., Heft i. and iii., Würzburg, 1879.—4. Practitioner, vol. xxxiii., p. 409; vol. xxxv., p. 414.—5. Extra Pharmacopœia, 5th ed., 1888, p. 53.—6. Lancet, 1882, vol. i., p. 578.—7. In the preparation of this article we have borrowed largely from the admirable work of Mlle. Oeounkoff, brought out under the direction of M. Verneuil (Du rôle physiologique de l'éther sulfurique, de son emploi en injections sous-cutanées comme médicament excito-stimulant, Paris, 1877), also from that of M. Dupuy (Des injections sous-cutanées d'éther sulfurique, de leur application au traitement du choléra dans la période algide, Paris, 1882). These are without exception the two best essays which have appeared down to the present time on the subject.—8. Quoted from Eulenburg, Ziemssen, i., 1880.—9. Acad. de méd., Nov. 19, 1882.—10. Lermoyez, Bulletin de thérapeutique, 1884.—11. Seifert, Über die Wirkung des Agaricin gegen die Nachtschweisse der Phthisiker, Wien. med. Woch., No. 38, 1883.—12. Fronmüller, Über Abführen auf subcutanem Wege. Memorabilien, xxvii., Feb., 1882.—13. Kohn, zur Wirkung der Aloes. Berl. Klin. Woch., xix., No. 5.—14. Braithwaite's Retrospect, lxxxvi., 27.—15. Journ. Amer. Med. Assoc., 1885, iv., 149. See full details in Lond. Med. Rec., xii., 356.—16. Brit. Med. Journ., 1882, i.,

457.—17. Contributions à l'étude physiologique du chlorhydrate d'apomorphine, Lausanne, 1875.—18. Vulpian, Maladies du système nerveux, 1879, 479-481.—19. N. Y. Med. Record, 1883, xxiv., 167.—20. Ibid., 1876, Jan.—21. Union médicale, 1884, Sept. 27.—22. Consult for further details: Villard, Du Haschisch, étude clinique, physiologique et thérapeutique. Paris, 1872.—23. Lond. Med. Record, x., 452, and Braithwaite's Retrospect, vol. xc., 174.—24. Fronmüller, Zur Wirkung des phosphorsauren Codeins. Med. Chir. Rundschau, 1883, No. 10.—25. Cotorinde und Cotoin. Würtemb. Med. Corresp., 1876, No. 20.—26. G. Lehmann, Zur therapeut. Wirkung des Curarinum sulfuricum. Allg. Zeitsch. f. Psych., vol. xli., xliii., 1884.—27. Stocquart, Note sur les injections hypodermiques de teinture de seigle ergoté. Ann. de la Soc. méd. chir. de Liége, 1884.—28. Arch. f. exp. Path. u. Pharm., 1884.—29. Dron, The treatment of syphilis by subcutaneous sublimate injections. Philad., 1882.—30. London Med. Rec., xiv., 37-38.—31. This section ("Hyoscine") is based on the experimental researches of Prof. H. C. Wood, M.D., of Philadelphia, published in the Therap. Gazette, 1885, and on recent papers by Dr. Mitchell Bruce and others.—32. Thimann, Zur Anwendung des Natrium ichthyosulfuricum. Deutsch. Med. Zeit., 1884, June 28; Unna, ibid., 1883, 237.—33. Brit. Med. Journ., 1887, i., 636.—34. London Med. Rec., xv., 152.—35. Gaz. med. ital., Lombard, 1883, Aug. 25.—36. See especially: Fonssagrives, art. Morphine, in Dictionnaire encyclopédique. Also, Nothnagel u. Rossbach's Handbuch d. Therapie.—37. Lewinstein, Die Morphiumsucht, Berlin, 1877.—38. Brit. Med. Journ., 1885, i. 1257.—39. Wiener Med. Wochensch., 1875, 34.—40. See Dr. Schadeck's paper in St. Petersburg Med. Wochensch., 1886, No. 29. Abstract in Therap. Gazette, xi., 121.—41. London Med. Record, xiii., 228.—42. Zeitsch. f. Klin. Med., v., 242.—43. Hippocrate Callias: De la résorcine et de son emploi en thérapeutique. Paris, 1881.—44. Moncorvo, De la coqueluche et de son traitement par la résorcine, Paris, 1885.—45. Consult, on the physiological properties of the preparations and proximate principles of squill: König, Untersuchungen über die Wirkungsart des Extractum Scillæ, Scillitin, und Theveresin. Göttingen, 1875; C. Möller, Über Scillipicrin, Scillitoxin und Scillin. Göttingen, 1878.—46. Dujardin-Beaumetz, Curabilité et traitement de la phthisie pulmonaire. Paris, 1881.—47. For further details see Dr. Geneuil's papér in the Bull. gén. de thérapeutique, abstracted in the Therap. Gazette, xi., 56.—48. Therap. Gazette, xi., 42, 43.—49. Therap. Gazette, 1887, 35.—50. For further details see Lancet, 1887, i., 542; Therap. Gazette, xi., 249.

TABLE OF ANTIDOTES AND ANTAGONISMS.[1]

Aconite and its preparations (extract of aconite, aconitine, etc.)	Antidotes	Ammonia (used successfully by Richardson). Atropine. Brandy (or some other form of alcohol). Digitalis (10 to 20 drops of the tincture). Ether. Nitrite of Amyl. Strychnine.
Agaricin	Antidote	Atropine.
Antimony	Antidotes	Apomorphine (to induce vomiting). Morphine (after subsidence of acute symptoms).
Arsenic	Antidotes	Apomorphine. Morphine (as in poisoning by antimony).
Atropine and Belladonna	Antidotes	Apomorphine. Chloral Hydrate. Morphine.
	Antagonists	Muscarine. (?) Physostigma. Pilocarpine.
Caffeine	Antagonist	Morphine.
Calabar Bean, preparations of	Antagonists	Atropine. Strychnine.
	Antidotes	Chloral. Camphorated Oil. Ether.[2]

[1] For General Poisoning see Therapeutic Index. This table is by no means intended to be a complete toxicological chart: it simply comprises remedies which have been, or may be, used hypodermically as antidotes or antagonists. The list has been compiled from numerous works, among which may be mentioned the manual itself, Ziemssen's "Cyclopædia of the Practice of Medicine," vol. xvii.; Neale's "Digest;" and my friend Mr. Murrell's invaluable little handbook, "What to do in Cases of Poisoning," 5th Edition. There are also numerous quotations from the Lancet, British Medical Journal, Medical Times and Gazette, Practitioner, London Medical Record, and Braithwaite's Retrospect.

[2] Ziemssen, loc., cit., p. 704.

Camphor	Antidotes	Alcohol. Apomorphine. Ether.
Camphor, Monobromated	Antagonist	Strychnine.
Cannabis Indica	Antagonist	Strychnine.
Cantharidin	Antidotes	Apomorphine. Morphine.
Carbolic Acid	Antidotes	Alcohol. Apomorphine. Atropine. Ether. Nitrite of Amyl.
Carbonic Oxide	Antidote	Ergotine.
Chloral Hydrate	Antidotes	Apomorphine.[1] Nitrite of Amyl.[2]
	Antagonists	Picrotoxin. Strychnine.[3]
Chloroform	Antidotes	Ammonia.[4] Atropine. Digitalis. Ether. Nitrite of Amyl. Strychnine.
Coniine	Antagonist	Strychnine. (?)
	Antidote	Atropine. (?)
Curarine	Antidote	Strychnine.
Daturine	Antagonist	Eserine.
	Antidotes	Morphine.[5] Pilocarpine.

[1] Mentioned by Dr. Murrell, condemned by David. (See under Apomorphine.)

[2] Brit. Med. Jour., 1879, vol. i., p. 969.

[3] Levinstein asserts that strychnine is a true antidote to chloral. He reports recovery in a case of poisoning by 372 grains, after two subcutaneous injections, of $\frac{1}{2\frac{1}{2}}$ and $\frac{1}{3\frac{1}{5}}$ of a grain respectively, of strychnine. In a case of accidental poisoning (absorption from chloral dressings in amputation above the knee) in the Edinburgh Royal Infirmary, under the care of Dr. John Duncan, I administered three doses of $\frac{1}{3\frac{1}{2}}$ of a grain each of strychnine. The patient recovered.

Husemann and Kröger recommended atropine as an antidote. (See London Medical Record, vol. xii., p. 182.)

[4] May be injected intravenously or hypodermically.

[5] Neale's "Digest," 1882 (378,5).

Digitalis and Digitalin	Antidotes	Aconitine. Alcohol. Apomorphine.
	Antagonist[1]	Hydrochlorate of Pereirine. (?)
Duboisine	Antagonists	Jaborandi and Pilocarpine. Muscarine.
Emetine	Antagonist	Strychnine.[2]
Ergot, Extract of, Ergotin, etc.	Antidotes	Alcohol. Ammonia.[3] Camphor. Ether. Nitrite of Amyl.
Ether	Antidote	Nitrite of Amyl.
Gelsemine	Antidotes	Alcohol. Atropine. Ether.
Hydrocyanic Acid	Antidotes	Alcohol. Ammonia. Atropine.[4] Ether.
Hyoscyamine	Antagonist	Eserine partially.
Lead	Antidotes	None certain. Cayoponine has been tried, but with injurious results.
Mercury	Antidote	Pilocarpine.
Morphine and Opium	Antidotes	Alcohol with Coffee.[5] Atropine.[6] Caffeine. Camphor. Cocaine.[7] Coffee (better administered per rectum). Ether. Nitrite of Amyl. Strychnine.

[1] In effects on the heart.

[2] Martindale and Westcott's "Extra Pharmacopœia."

[3] To avert cardiac paralysis.

[4] Böhm (Ziemssen, loc. cit., p. 511) says that recent experiments show that atropine cannot be recommended as an antidote.

[5] See case reported by Flood—quoted p. 352.

[6] Johnstone (Medical Times, 1872—1873) saw eleven recoveries out of seventeen cases of opium poisoning by the atropine treatment.

[7] Of great use in chronic poisoning.

Mushrooms	Antidotes	Apomorphine. Atropine.
Nicotine	Antidotes	Apomorphine. Strychnine.
Nitroglycerin	Antidotes	Atropine. Ergotin.
Picrotoxin	Antidote	Chloral.
Pilocarpine	Antidotes	Atropine. Homatropine.
Resorcin	Antidotes	Acohol. Ammonia. Atropine. Nitrite of Amyl.
Strychnine and Nux-Vomica	Antidotes	Aconitine. (?) Apomorphine.[1] Atropine. Calabar Bean. (?) Camphor. Cannabis Indica. Chloral Hydrate. Cocaine.[2] Curarine. Emetine. Eserine. Morphine. Nicotine. (?) Nitrite of Amyl.[3] Prussic Acid.[4]

[1] British Medical Journal, vol. ii., 1878, p. 374.

[2] Lancet, vol. i., 1885 p. 439.

[3] "Nitrite of amyl appears to be one of the most reliable antidotes. It may be administered hypodermically or by inhalations."—Dr. Barnes, British Medical Journal, vol. i., 1882, p. 457.

[4] Hydrocyanic acid, according to Dr. Ladell, is an undoubted antidote, but not free from danger, as, to be of any use, it must be administered in toxic doses. (British Medical Journal, vol. ii., 1883, p. 355).

HYPODERMIC POSOLOGICAL TABLE.

ACIDUM ARSENIOSUM. (See *Arsenium.*)

" BENZOICUM. $\frac{3}{4}$ to $1\frac{1}{2}$ grains several times daily.

" CARBOLICUM. $\frac{1}{14}$ to $\frac{1}{6}$ of a grain.

" HYDROCYANICUM (U. S.). $\frac{1}{2}$ to 2 minims of medicinal acid. (See also *Potassii Cyanidum.*)

" OSMICUM. $\frac{1}{14}$ to $\frac{1}{4}$ of a grain.

" SCLEROTINICUM. $\frac{1}{2}$ to $4\frac{1}{2}$ grains, increased cautiously to 9 grains.

" TANNICUM. From 16 to 32 minims of a 10 or 20 per cent solution.

ÆTHER. 16 minims and upward.

ACONITINA. $\frac{1}{240}$ to $\frac{1}{60}$ of a grain of Morson's preparation. The dose may be carefully increased up to $\frac{1}{24}$ of a grain. Duquesnel's aconitine should never be administered hypodermically.

AGARICINUM. $\frac{1}{14}$ of a grain.

ALCOHOL. No definite dose can be fixed. To be given according to urgency. (In cases of post-partum hemorrhage the translator has found benefit from 40-minim doses of brandy repeated frequently.)

ALCOHOL AMMONIATUM. 5 to 10 minims.

ALOE. $1\frac{1}{2}$ grains in aqueous solution.

ALOINUM. Produces too much local irritation to be useful for hypodermic purposes.

AMMONIÆ AQUA. 2 to 5 minims.

AMYL NITRIS. 8 to 12 minims of 10-per-cent alcoholic solution.

ANTIHYDROPINUM. Sixteen minims of tincture.

ANTIMONII ET POTASSII TARTRAS. $\frac{1}{4}$ grain.

ANTIPYRINA. 25 to 30 grains at intervals of an hour, till three injections have been made. In children $1\frac{1}{2}$ grains for each year of age.

APOCODEINÆ HYDROCHLORAS. $\frac{1}{6}$ to $\frac{1}{3}$ of a grain.

APOMORPHINÆ HYDROCHLORAS. $\frac{1}{16}$ to $\frac{1}{4}$ of a grain. (To be used with caution, alarming symptoms having been caused by $\frac{1}{15}$ of a grain. 2 to 8 minims of a 2% solution.)

Aqua. In varying quantities, with or without salines, and either iced (in hyperpyrexia) or at a high temperature.

Arbutinum. Seldom used subcutaneously. Dose. by mouth, 15 grains; subcutaneously, 4 grains.

Argenti Nitras. $\frac{1}{6}$ to $\frac{1}{3}$ of a grain.

" Chloridum. $\frac{1}{14}$ of a grain.

Arsenium. $\frac{1}{4}$ to $\frac{2}{3}$ of a grain of arsenious acid has been injected by Lipp in cases of psoriasis and chronic eczema. 2 to 8 minims of Fowler's solution. Arseniate of sodium, $\frac{1}{30}$ to $\frac{1}{15}$ of a grain.[1]

Aspidosperminæ Sulphas. $\frac{3}{4}$ to $1\frac{1}{2}$ and 3 grains.

Atropinæ Sulphas. $\frac{1}{140}$ to $\frac{1}{70}$ and $\frac{1}{30}$ of a grain.

Auri Chloridum. $\frac{1}{30}$ of a grain.

Auri et Potassii Cyanidum. $\frac{2}{3}$ to $\frac{3}{4}$ of a grain.

Bromum. 1-minim doses, in hospital gangrene.

Caffeina. $\frac{1}{4}$ to $1\frac{1}{2}$ grains.

Calabar Bean. (See *Physostigma.*)

Camphora. $1\frac{1}{2}$ to 3 grains.

Camphora Monobromata. $1\frac{1}{2}$ to 3 grains.

Cannabis Indica. 2 to 5 minims of tincture.

Cantharidis Tinctura. 10 to 20 minims

Cantharidinum $\frac{1}{1400}$ to $\frac{1}{140}$ of a grain.

Cedrinum. $\frac{1}{16}$ of a grain (maximum dose).

Chloral Hydras. $2\frac{1}{2}$ to 7 grains.

Croton Chloral Hydras. $\frac{1}{2}$ to 4 grains. Unsuitable for hypodermic use on account of its irritant action.

Chloroformum. 15 to 40 minims.

Chrysarobinum (Acidum Chrysophanicum). $\frac{1}{600}$ to $\frac{1}{140}$ grain.

[1] Bartholow (loc. cit., p. 243) recommends the liquor sodii arseniatis, in preference to Fowler's solution, for hypodermic purposes, in doses of 5, 10, or even 15 minims. It is claimed for this salt that it is less irritant in its local effects, that it is less apt to produce arsenical poisoning, and that it possesses greater osmotic power than Fowler's solution. The injections are made on alternate days, and in different situations so as to minimize the local effects.

Mr. Jonathan Hutchinson thinks that the therapeutic effects of arsenic are best obtained by a combination of the arseniates of potassium and sodium.

CINCHONIDINÆ HYDROBROMAS vel SULPHAS. 1 to 8 grains.
COCAINA. $\frac{1}{4}$ to $\frac{1}{2}$ of a grain.
CODEINA. $\frac{1}{8}$ to $1\frac{3}{4}$ grains.
COLCHICINA. $\frac{1}{3\frac{1}{3}}$ of a grain. [?]
CONIINA. $\frac{1}{12}$ to $\frac{1}{18}$ of a grain.
CONIINÆ HYDROBROMAS. $\frac{1}{3}$ grain.
COTOINUM. 4 grains.
CREASOTUM. 3 to 6 minims.
CROTONIS OLEUM. Unsuitable for hypodermic purposes.
CUPRI SULPHAS. Unsuitable for hypodermic purposes.
CURARE. $\frac{1}{12}$ to $\frac{1}{2}$ of a grain.
CURARINA. $\frac{1}{70}$ to $\frac{1}{14}$ of a grain.

DATURINA. $\frac{1}{120}$ to $\frac{1}{60}$ of a grain. (See *Stramonium.*)
DIASTASE. $1\frac{1}{2}$ to 3 grains.
DIGITALINUM. $\frac{1}{40}$ of a grain, cautiously increased. (Tincture of digitalis may be given hypodermically; besides causing less irritation than does digitaline, it is a safer remedy.)
DUBOISINA. $\frac{1}{140}$ to $\frac{1}{70}$ of a grain.

EMETINA. From $\frac{1}{40}$ of a grain as an expectorant, to $\frac{1}{14}$ of a grain as an emetic.
ERGOTÆ EXTRACTUM (AQUOSUM). $\frac{1}{2}$ to 1 grain.
ERGOTINUM. $1\frac{1}{2}$ to 2 grains.
ERGOTININA. $\frac{1}{3\frac{1}{3}}$ of a grain.
ETHER. (See *Æther.*)
EUCALYPTOL. 15 minims and upward of a 20-per cent solution in vaselin.

FERRI PYROPHOSPHAS. $1\frac{1}{2}$ to 3 grains.
" CITRAS. 1 to 2 grains.
FERRUM PEPTONATUM. $1\frac{1}{2}$ to 3 grains.

GELSEMINÆ HYDROCHLORAS. $\frac{1}{140}$ to $\frac{1}{70}$ of a grain.
GLYCERINUM. $\frac{1}{2}$ to 1 drachm, as a substitute for cod-liver oil.
GUACHAMACÆ EXTRACTUM. $\frac{1}{4}$ of a grain.

HOMATROPINÆ HYDROBROMAS. $\frac{1}{5}$ of a grain.
HYDRARGYRI BICHLORIDUM. $\frac{1}{160}$ to $\frac{1}{60}$ of a grain.
" BINIODIDUM. $\frac{1}{14}$ to $\frac{1}{4}$ of a grain.

Hydrargyri Chloro-Albuminas. $\frac{1}{14}$ of a grain.
" Chloridum Mite (Calomel). $\frac{3}{4}$ to $1\frac{1}{2}$ grains.
" Cyanidum. $\frac{1}{14}$ to $\frac{1}{4}$ of a grain.
" Glycocholas. $\frac{1}{14}$ to $\frac{1}{4}$ of a grain.
" et Sodii Iodidum. $\frac{1}{5}$ of a grain.
Hydrargyrum cum Urea. (See p. 434.)
" Formamidatum. 8 to 16 minims of a 1-per-cent solution.
" Peptonatum. $\frac{1}{4}$ of a grain.
Hydroquinonum. 5 to 10 minims of a 10-per-cent solution. Two injections, one into each arm, to be made simultaneously.
Hyoscinæ Hydriodas (or other salts). $\frac{1}{200}$ to $\frac{1}{60}$ of a grain.
Hyoscyamina. $\frac{1}{60}$ of a grain.
Hypnonum. 2 to 4 minims: is not adapted for hypodermic use.

Ichthyol. 16 minims of a 5 to 10 per cent aqueous solution.
Injectiones Nutrientes Hypodermicæ. (Oils—almond, cod-liver, and olive; sugar, milk, beef juice, defibrinated blood, blood serum, etc.) (See text.)
Iodoformum. 1 to 3 grains.

Kairina. $1\frac{1}{2}$ to 8 grains.

Lithii Bromidum. $\frac{8}{4}$ of a grain (unsuitable for hypodermic use).

Magnesii Chloridum. (Of little use.)
" Sulphas. (Of little use.)
Morphinæ Acetas. $\frac{1}{10}$ to $\frac{2}{3}$ of a grain.
" Bimeconas. $\frac{1}{4}$ to $\frac{1}{2}$ of a grain.
" Hydrochloras. $\frac{1}{4}$ to $\frac{1}{4}$ of a grain.
" Sulphas. $\frac{1}{4}$ to $\frac{1}{4}$ of a grain.
" Tartras. $\frac{1}{4}$ to $\frac{1}{4}$ of a grain.
Moschi Tinctura. 16 to 48 minims per diem.
Muscarina. $\frac{1}{3}$ to $\frac{3}{4}$ of a grain.

Napellina. $\frac{1}{4}$ to $\frac{1}{2}$ of a grain.
Narceinæ Hydrochloras. $\frac{1}{18}$ to $\frac{1}{4}$ of a grain.
Narcotina. Dose uncertain.

NICOTINA. $\frac{1}{10}$ of a grain.

NITROGLYCERINUM. 2 to 6 minims, in the 24 hours, of 1-per-cent alcoholic solution. ($\frac{1}{240}$ to $\frac{1}{60}$ of a grain.)

OLEANDRINA. 1 grain.

OLEUM AMYGDALÆ. 1 to 4 drachms. (Cod-liver and olive oils may be given in the same doses.)

" TEREBINTHINÆ. (See *Terebinthina* and *Vaselin.*)

" TIGLII. (See *Crotonis Oleum.*)

OPIUM, AQUEOUS EXTRACT AND TINCTURE OF. Not used now.

PAPAVERINÆ HYDROCHLORAS OR PHOSPHAS. 6 to 12 minims of a 1 to 12 solution.

PARACOTOINUM. 1 to 2 grains.

PARALDEHYDUM. 4 minims.

PEREIRINA. $\frac{2}{3}$ to $1\frac{1}{3}$ grain.

PHYSOSTIGMA (CALABAR BEAN). $\frac{1}{4}$ to $\frac{1}{2}$ grain of extract.

PHYSOSTIGMINA (ESERINA). $\frac{1}{24}$ to $\frac{1}{8}$ grain.

PICROTOXINUM. $\frac{1}{140}$ to $\frac{1}{48}$ of a grain.

PILOCARPINÆ HYDROCHLORAS OR NITRAS. $\frac{1}{14}$ to $\frac{1}{4}$ of a grain.

POTASSII BROMIDUM. $\frac{1}{2}$ a grain to 8 grains.

" CYANIDUM. $\frac{1}{32}$ to $\frac{1}{16}$ of a grain.

" IODIDUM. 1 to 8 grains.

" PERMANGANAS. $\frac{1}{4}$ to $\frac{1}{3}$ of a grain.

QUINIDINA AND ITS SALTS. Are unsuitable for hypodermic use.

QUININÆ CARBOLAS. 5 to 15 grains.[1]

" ET UREA HYDROCHLORAS. 16 minims of a 10-per-cent solution.

" HYDROBROMAS. 1 to 4 grains. Acid hydrobromate, 2 to $3\frac{1}{2}$ grains.

" SULPHAS. 1 to 4 grains.

" SULPHOVINAS. $2\frac{1}{2}$ grains.

" TARTRAS. 1 to 4 grains.

QUINOIDINA. $2\frac{1}{2}$ to 5 grains.[2]

QUINOLINÆ CITRAS.
" HYDROCHLORAS. } 3 to 15 grains.
" TARTRAS.

[1] Has been used in cholera.

[2] Eulenburg condemns the hypodermic use of this drug.

Resorcinum. ½ to 3 grains.

Saponinum. $\frac{1}{8}$ to ¼ of a grain.
Scillipicrinum. ⅓ to 1½ grains.
Sodii Chloridum. (See text.)
" Iodidum. 4½ to 9 grains.
" Lactas.[1] 9 grains.
" Salicylas. 1 to 8 grains.[2]
" Sulphas. 1½ to 3 grains.
" Phosphas. 1½ to 3 grains.
Solanina. From 1 to 3, 4, or even 8 grains daily.
Sparteinæ Sulphas. $\frac{2}{3}$ to ½ of a grain.[3]
Stramonii Extractum. $\frac{1}{12}$ to ⅓ of a grain.
Strychninæ Arsenias. $\frac{1}{64}$ cautiously increased to $\frac{1}{16}$ of a grain.
" Nitras. $\frac{1}{64}$ to $\frac{1}{32}$ of a grain.
" Sulphas. $\frac{1}{64}$ to $\frac{1}{16}$ of a grain.

Tayuyæ Tinctura. 16 minims.
Thallinæ Sulphas. 1½ to 3 grains (repeated at frequent intervals as required).

Urethanum. 5 grains and upward.

Valdivina. $\frac{1}{35}$ to $\frac{1}{17}$ of a grain.[4]
Veratrina. $\frac{1}{12}$ to $\frac{1}{24}$ of a grain.

[1] Not well adapted for hypodermic use.

[2] As much as 16 grains has been given in the first stage of yellow fever.

[3] Sulphate of sparteine administered hypodermically in doses of $\frac{2}{3}$ to $\frac{1}{2}$ of a grain, in conjunction with the internal administration of nitroglycerin, has proved in the hands of Professor Ball and Dr. Oscar Jennings, of Paris, of inestimable service in the treatment of morphiomania. The indication for its use is furnished by the sphygmograph and by the feeling of depression experienced by the patient. "Lancet," 1887, vol. i., p. 1278.

[4] Maximum dose.

THERAPEUTIC INDEX OF DISEASES.

NOTE.—As the drugs in the text are arranged in alphabetical order (according to their Latin names), it will be easy to refer to the several remedies enumerated in the list of diseases.

ABSCESS.

Cocaine injected before operation.

[The effect is increased by applying a ligature above the part operated on in the first instance. Major operation have also been performed under the local anæsthetic influence of cocaine. Dr. Varick ("New York Med. Jour.," 1886) has in this way performed amputation through the thigh, and Mr. Mayo Robson, of Leeds ("Brit. Med. J.," vol. ii., 1886, p. 859), has excised a portion of the tongue ten minutes after injection of one grain of cocaine hydrochlorate without causing the slightest pain.—TRANS.]

ADYNAMIA.

Alcohol.
Ammoniated alcohol with anise.
Ammonia.
Camphor.
Musk.

AFTER-PAINS.

Chloral hydrate.
Chloral and ergotin.
Morphine.
Morphine and atropine.

AGUE (SEE FEVER, INTERMITTENT).

ALBUMINURIA.

Caffeine (inferior to other diuretics).
Cantharidin (in chronic albuminuria).
Nitrite of amyl.
Nitroglycerin.
Scillipicrin.
Scoparin.
Sparteine.

ALCOHOLISM.

Ammonia (used successfully in a case complicated with sunstroke).

ALOPECIA.

Pilocarpine.

AMENORRHŒA.

Ferruginous preparations with quinine.
Ferruginous preparations with strychnine.

ANÆMIA.

Alcohol (in form of brandy or whiskey).
Alcohol with ammonia.
Blood, human (used successfully).
Blood, human, intraperitoneal injection.
Ferruginous preparations (have succeeded by hypodermic, after failure by ordinary methods).
Nitroglycerin.
Opium, preparations of, in cerebral anæmia.

ANEURISM.

Ergot and its preparations (extract of ergot, ergotin, ergotinine).

["From ½ to 4½ grains of watery extract of ergot dissolved in a mixture of one part of glycerin to five of alcohol, or in glycerin and water, equal parts, have been injected over or in the neighborhood of the tumor at intervals varying from half a day to several days." Cure of subclavian, radial, and even of abdominal aortic aneurism has been obtained by Langenbeck, Wolff, and others. Ziemssen's "Cyclopædia of Practice of Medicine," vol. vi., p. 452.—TRANS.]

[Fibrin-ferment, recommended by Dr. Arthur Gangee, has been used by Mr. Southam. This treatment was unsuccessful, but Mr. Southam recommends further experiments. The ferment is injected

into the sac ("Brit. Med. Jour.," vol. ii., 1883, p. 321).—Trans.].
Iron, preparations of, by interstitial injections.

Angina Ludwigii. Ludwig's angina. (Malignant or phagedænic sore throat.)
Apocodeine.
Apomorphine.
Aponarceine.
Carbolic acid (interstitial injections).
Tartar emetic.
Emetine.

Agina pectoris.
Aconite, preparations of (extract of aconite, aconitine).
Coniine.
Hydrocyanic acid.
Nitrite of amyl.
Nitroglycerin.
Sodium chloride.

Anus, fissure of.
Iodoform.

Anus, prolapse of.
Ergotin.
Strychnine.

Aorta, diseases of (see Heart Diseases).
Nitrite of amyl.
Nitroglycerin.

Aphonia.
Strychnine (when the disease is of paralytic origin).

Appetite, loss of.
Cotoin.
Paracotoin (disadvantageous on account of its sparing solubility).
Sodium chloride (used by Lubanski to stimulate appetite and digestion in phthisis).

Arthritis.
Iodoform.
Nitrate of silver.

Arthritis deformans.
Aconitine.

Ascites (see Dropsy).

Asphyxia.
Apocodeine.
Apomorphine.
Aponarceine.

Asthma (see also Dyspnœa.)
Aspidospermine.
Atropine.
Codeine.
Coniine.
Duboisine.
Hyoscine.
Morphine.
Nitrite of amyl.
Nitroglycerin.
Solanine (both in bronchial and cardiac asthma).

Athrepsia (Infantile Atrophy).
Sodium sulphate with sodium phosphate.

Atrophy (see Emaciation).

Atrophy, progressive muscular.
Strychnine.
[Arsenic and nitrate of silver hypodermically and internally, and phosphorus internally, have been used, but without encouraging results. Prof. Eulenburg has used strychnine extensively (Ziemssen, loc. cit., vol. iv., p 150), but without any benefit.—Trans.]

Bites of venomous serpents.
Ammonia, hypodermically and intravenously.
Cedrin.
Permanganate of potassium.
Valdivine (has not proved to be of any use).

Bladder, catarrh of.
Arbutin.

Blepharospasm.
Coniine.

Bright's Disease.
Caffeine (as a diuretic, inferior to other diuretics).
Cantharidin (in chronic forms).
Digitalin.
Nitrite of amyl, in interstitial nephritis.
Nitroglycerin, in interstitial nephritis.
[Nitroglycerin is said to diminish

albumin and to increase the diurnal quantity of urine. Rossbach asserts that it prolongs life and cuts short grave attacks.—TRANS.]

BRONCHITIS.

Benzoic acid and benzoate of sodium.
Coniine.
Solanine.
Water to which a few drops of cherry-laurel water have been added. One syringeful to be injected into the neighborhood of parts in which painful sensations are experienced.

BUBO.

Iodoform.
[Carbolic acid, chloride of ammonium, bichloride of mercury, and sulphate of copper have also been used hypodermically. —TRANS.]

CALCULI (BILIARY, RENAL AND VESICAL).

Atropine and morphine.
Morphine.

CANCER.

Aloes and aloin for constipation.
Chloroform.
Cinnamon as local stimulant.
Iodoform.

CARBUNCLE.

Carbolic acid.
Mercury (interstitial injection).

CATALEPSY.

Curare has been injected hypodermically, but without benefit. [*See* Ziemssen, loc. cit., xiv., p. 382.—TRANS.]

CATARRH.

Apocodeine.
Apomorphine.
Aponarceine.
Tincture of nux vomica in suffocative catarrh.

CHEST-PAINS.

Saponin (for intercostal neuralgia). Not adapted for hypodermic use.

CHLOROSIS.

Iron, preparations of.
Iron with arsenic.

CHOKING.

Apocodeine.
Apomorphine.
Aponarceine.
Tartar emetic.
Emetine.

CHOLERA.

Ammonia with spirit of peppermint has been used successfully.
Ammonium sulphate.
Arsenic.
Caffeine.
" with benzoate of sodium.
" " salicylate of sodium.
Camphor (Ziemssen, loc. cit., vol. xv. p. 244).
Chloral hydrate
Cotoin.
Cotoin with chloral
Ether.
Morphine before collapse.
Morphine with atropine in intermediate stages.
Atropine during collapse.
Musk.
Nitrite of amyl (of no use).
Paracotoin.
Pilocarpine with pepsin.
Potassium iodide in stage of asphyxia.
Quinine.
Quinine with carbolic acid (1st stage).
Sodium chloride ("Lond. Med. Record," vol. xiv., p. 108).
Sodium sulphate.
Strychnine (2d stage).
Tannin ("London Medical Record," vol. xiv., p. 108).
Water, subcutaneously, intravenously and intraperitoneally.
Water, with salines, morphine, opium, or camphor.

CHOREA.

Arsenic.
Atropine.
Calabar bean and its preparations.
Coniine.
Curarine.
Hyoscyamine.
[Morphine and opiates are of the greatest value in some cases. —TRANS.]

CHOROIDO-SCLEROTITIS.

Pilocarpine.

COLIC.

Atropine.
Atropine with morphine.
Chloroform.
Water (especially hot water).
Eserine in veterinary practice.

COLLAPSE.

Ammonia, hypodermically and intravenously.
Ammonia with alcohol.
Benzoic acid.
Brandy.
Ether (sulphuric, acetic, and Hoffmann's anodyne).
Musk.
Nux vomica tincture.
Strychnine.

COMA (SEE ALSO URÆMIA).

Ether, when coma is due to excessive hemorrhage.

CONSTIPATION.

Aloes and aloin.
Atropine.
Castor oil. (Recommended by Shoemaker.)
Croton oil (to be avoided).
Magnesium chloride.
Magnesium sulphate.
Sodium sulphate.

CONTRACTURE.

Guachamaca.
Physostigmine (Ziemssen, vol. xiii., p. 187).

CONVULSIONS.

Apocodeine.
Apomorphine, and other emetics.
Ergotin.
Ether, in infantile convulsions at beginning of a pneumonic attack.
Quinine.

CONVULSIONS, PUERPERAL.

Potassium bromide.
[Chloral has frequently been administered subcutaneously with marked success; morphine, nitrite of amyl and pilocarpine have also been used.—TRANS.]

COUGH.

Agaricin, useful in phthisis.
Coniine.
Cherry-laurel water.
Ergotin.
Cannabis Indica, in phthisis.
Homatropine, in phthisis.
Morphine with tartar emetic.

CROUP.

Apomorphine and other emetics.
Calomel.
Cystitis.
Solanine.

DELIRIUM TREMENS.

Digitalin.
Strychnine.
[Opium, morphine, and hyoscyamine have also been given subcutaneously. Some authors speak of strychnine as a specific.—TRANS.]

DIABETES INSIPIDUS. POLYURIA.

Ergot and its preparations, especially ergotin.
Pilocarpine.

DIABETES MELLITUS.

Carbolic acid.
Codeine. (*See* Ziemssen, loc. cit., xvi., 994.)
Diastase.
Ergotin.
Morphine.

DIARRHŒA.

Cinnamon.
Cedrin (in chronic diarrhœa).
Cotoin (except when diarrhœa is due to ulceration, alcoholism or cirrhosis).
Opium.
Resorcin.
Sodium chloride in phthisis (acts by stimulating appetite and digestion).

DIPHTHERIA.

Benzoate of sodium.
Carbolic acid.
Apomorphine and other emetics.
Mercury, preparations of.
Permanganate of potassium.
Pilocarpine.

DROPSY.

Antihydropin.
Caffeine (in dropsy associated with fatty degeneration of the heart).
[Digitalin.—TRANS.]
Ether.
Pilocarpine.

DYSENTERY.

[Camphorated oil (Ziemssen, loc. cit., vol. i., p. 567).—TRANS.]

DYSPEPSIA.

Apomorphine.
Physostigmine in veterinary practice.
Sodium chloride in phthisis.
Solanine.

DYSPHAGIA (OF PHTHISIS).

Cocaine.

DYSPNŒA.

Aspidospermin.
Coniine.
[Morphine is of special use, according to Dr. Beckart, in those forms of asthmatic dyspnœa associated with œdema of the lungs, as it occurs in the obese and the cachetic, and in those suffering from valvular lesions of the heart, from gout, and from renal disease. (uræmic asthma). "In these circumstances the injection of $\frac{1}{8}$ of a grain of morphine acts like a charm." Brit. Med. Jour., vol. ii., 1880, p. 80.—TRANS.]
Nitrite of amyl.

DYSURIA.

Scoparin.
Sparteine.

ECLAMPSIA.

Coniine.
Hydrocyanic acid.
Hydrate of chloral.
Hyoscine.
Musk (especially in infants).
Nitroglycerin.
Pilocarpine.

ECTHYMA.

Ichthyol.
Iodoform.

ECZEMA.

Arsenic (in chronic forms).
Chrysophanic acid.
Ichthyol.

ELEPHANTIASIS.

Mercury by interstitial injections.

EMACIATION.

Defibrinated blood.
Oils (almond, cod-liver, and olive).
Peptones.
Solution of sugar.

EMPHYSEMA.

Apomorphine (when there is bronchitis).
Coniine.
Daturine.
Solanine.
Strychnine.

ENURESIS.

(*See* Incontinence.)

EPILEPSY.

Apomorphine.
Arsenic.
Atropine.
Camphor (see Medical Times and Gazette, vol. ii., 1878, p. 108).
Coniine.
Curarine.
Napelline.
Nitrite of amyl.
Nitroglycerin.
Oleandrine (used unsuccessfully).
Pilocarpine.
Potassium bromide.
Saponin (of doubtful efficacy).

EPILEPTIFORM NEURALGIA.

Morphine.
Nitrite of amyl.
Nitroglycerin.

EPISTAXIS.

Ergotin.

ERYSIPELAS.

Carbolic acid.
Quinine.
Quinoline.
Resorcin ("London Medical Record," vol. xi., pp. 15, 196).

EXOPHTHALMOS.

Duboisine.
Ergotin and ergotinine (Braithwaite's "Retrospect," vol. xc., p. 128).

FEVER.

Antipyrine.
Aspidospermin.
Cedrin.
Coniine
Kairine (not to be used when

there is diminished hæmatosis).
Pereirine.
Quinine hydrobromate.
Hydroquinone.
Sodium salicylate.
Strychnine arseniate.
Thalline.
Veratrine.

FEVER, INTERMITTENT.
Aconitine.
Arsenic.
Carbolic acid with quinine.
Cedrin.
Ether with quinine.
Iodoform.
Pereirine.
Pilocarpine.
Quinine.
Quinoline.

FIBROIDS, UTERINE.
Cornutin.
Ergotin.
Sclerotinic acid.

GANGRENE.
Bromine.
Iodoform.

GASTRALGIA.
Hydrocyanic acid.
Iodoform.
Morphine.
Potassium iodide.
Strychnine.

GASTRIC ULCER.
Milk and beef juice alternately, 1 drachm every two hours used with success.
Dog's and chicken's blood.
Morphine.
Potassium iodide.

GLANDULAR ENLARGEMENTS.
Iodoform.
Potassium iodide.
Saline solutions.

GLAUCOMA.
Aloes and aloin (recommended by Klein to diminish inflammation and tension).

GOITRE.
Iodoform.

GOUT.
Cedrin.
Colchicine.
Nitrate of silver.

GUMMATA, INTERDIGITAL.
Iodoform.

HÆMATEMESIS.
Ergot (extract), ergotin, ergotinine.
Sclerotinic acid.

HÆMATURIA.
Ergotin.

HÆMOPTYSIS.
Apomorphine.
Atropine (of great value) ("Brit. Med. Jour.," vol. i., 1887, p. 842).
Ergotin (in phthisis without pyrexia).
Phosphoric acid.
Sclerotinic acid.

HÆMORRHAGE.
Alcohol.
Atropine (said by Tacke to be better than ergot).
Ergotin and ergotinine.
Ether (specially useful in cases of placenta prævia and post-partum hemorrhage).

HÆMORRHOIDS.
Ergotin.

HEADACHE (INCLUDING MIGRAINE).
Aconitine.
Antipyrine ("Brit. Med. Jour.," vol. i., 1887, p. 1177).
Caffeine
Cocaine.
Ergotin and ergotinine.
Nitrite of amyl.
Nitroglycerin.

HEART DISEASES.
Caffeine.
Convallaria majalis.
Digitalin.
Hyoscyamine.
Hyoscine hydriodate.
Nitrite of amyl.
Nitroglycerin.
[Dr. Mitchell Bruce ("Practitioner," vol. xxxvii., p. 324) reports a case of double aortic disease with cardiac dilatation, dropsy and albuminuria, in which hydriodate

of hyoscine was administered to control the wandering delirium. Compensation was practically re-established.—TRANS.]

HECTIC FEVER.

Aspidospermine (of doubtful efficacy).

HERNIA.

Caffeine.

HERPES ZOSTER.

Chloroform.
Morphine.

HYDROPHOBIA.

Atropine.
Cannabis indica.
Cedrin.
Curarine.
Hyoscyamine.
Hyoscine hydriodate to control spasms and produce sleep.
[Morphine subcutaneously over laryngeal nerve (Neale, "Practitioner," vol. ii., 1881, p. 218).
Morphine with atropine ("Lancet," vol. i., 1885, p. 525).
Physostigmine ("Lancet," vol. i., 1878, p. 862).—TRANS.]
Pilocarpine (useless).
Potassium bromide.
Quinine.

HYSTERIA.

Caffeine.
Coniine.
Gold chloride (in hysterical anæsthesia).
Nitrite of amyl.
Nitroglycerin.
Valerianate of ammonium.

HYSTERO-EPILEPSY.

Apomorphine.
[See case reported by Williams, "Med. Times and Gaz.," vol. ii., 1883, p. 655.—TRANS.]

INCONTINENCE OF URINE.

Atropine.
Benzoic acid (Neale's "Digest," Appendix, 1048.2).
Physostigmine.
Cantharidin.
Chloral hydrate (Neale's "Digest," 1048.2).
Ergotinine.
Strychnine.

INFLUENZA.

Apomorphine.

INSANITY.

Aloes (watery extract and aloin used by Kohn in constipation in the insane without any benefit).
[Cannabin tannate of Merck for insomnia.—TRANS.]
Codeine.
[Digitalin. Used by Sheppard in doses of $\frac{1}{8}$ to $\frac{1}{3}$ of a grain ("Med. Times and Gaz.," vol. ii., 1872, p. 482).—TRANS.]
Hyoscine hydriodate in various forms of insanity characterized by wild or restless delirium and insomnia. This comparatively new remedy has, so far, yielded excellent results.
Hyoscyamine.
Morphine.

INSOMNIA.

Caffeine, in alcoholic insomnia without delirium.
Cannabin tannate.
Cannabis Indica, useful in phthisical, not of much use in other forms.
Croton chloral (uncertain).
Chloroform.
Guachamaca.
Homatropine, in insomnia of phthisis.
[Hyoscine hydriodate in $\frac{1}{100}$ to $\frac{1}{50}$ and $\frac{1}{25}$ of a grain doses.—TRANS.]
Morphine.
Napelline.
Opium in insomnia due to cerebral anæmia.
Paraldehyde.
Potassium bromide.
Solanine.
Urethane.

KERATITIS.

Aloes and Aloin.

LABOR.

Cedrin.
Chloral hydrate. [Especially in cases of rigid os.—TRANS.]
Chloral hydrate with ergotin.
Cornutin.
Ergot (extract of), ergotin, ergotinine.

Morphine.
Morphine with atropine } [To stop ineffectual pains.—TRANS.]
Sclerotinic acid.

LARYNGISMUS STRIDULUS.

Apomorphine.
Coniine.

LARYNGITIS.

Apocodeine, apomorphine and other depressants and vomitives.
Coniine (to relieve spasm).
Morphine.
Mercury (especially in specific form). (*See* Croup.)

LICHEN.

Arsenic (especially in lichen ruber).
Chrysarobin.

LIGHTNING PAINS.

Morphine.
Pilocarpine.
Sodium salicylate. [Better by internal administration as recommended by Dr. Byrom Bramwell.—TRANS.]
Strychnine.

LOCOMOTOR ATAXY.

Arsenic (Ziemssen, vol. xiii., p. 615).
Ergot, preparations of (Ziemssen, vol. xiii., p. 615).
Hyoscyamine.
Morphine (*see* Lightning Pains).
[Nitrite of amyl, "Practitioner," vol. ii., 1878, p. 218.—TRANS.]
Silver, salts of.
Strychnine. [Erb (Ziemssen, vol. xiii., p. 615) considers the use of this alkaloid objectionable.—TRANS.]

LUMBAGO.

Antipyrine ("Brit. Med. Jour.," vol. i., 1887, p. 1177).
Atropine.
[Carbolic acid, "Med. Times and Gaz.," vol. ii., 1875, p. 343.—TRANS.]
Cherry-laurel water.
Chloroform.
Ether ("Med. Times and Gaz.," vol. ii., 1882, p. 429, and "Brit. Med. J.," vol. i., 1883, p. 511).
Hyoscyamine.
Morphine.
Napelline.
Nitrite of amyl (in one case it produced convulsions).
Sodium chloride.

LUNG, ACUTE DISEASES OF.

Aconitine in early stages.

LUPUS.

Arsenic.
Mercuric chloride ("Lancet," 1887, vol. ii., p. 75).
Sulpho-ichthyolate of sodium intracutaneously.

LYMPHOMA.

Arsenious acid.

MANIA.

Apomorphine.
Chloral hydrate.
Curarine (of no use).
Hydrocyanic acid.
Hyoscyamine and hyoscine hydriodate.
Quinine.
[The following remedies have also been used:
Atropine,
Cannabis tincture,
Cocaine,
Coniine,
Daturine,
Digitalin.—TRANS.]

MELANCHOLIA.

Caffeine.
Cocaine.
Hydrocyanic acid.
Paraldehyde.
[Hyoscine hydriodate is useful in melancholia with insomnia.—TRANS.]

MÉNIÈRE'S DISEASE.

[Quinine by internal administration recommended by Prof. Charcot ("Lectures on Diseases of the Nervous System," New Syd. Soc. Trans., vol. ii.), might be tried hypodermically in the form of hydrobromate.—TRANS.]
Nitroglycerin.

MENINGITIS.

Curarine.

METRORRHAGIA.

Ergotin.

[Strychnine is a most effectual remedy in most forms of uterine hæmorrhage,—TRANS.]

MORPHINE HABIT.

[Cocaine, in ½ grain doses of great value ("London Medical Record," vol. xiii., p. 107).—TRANS.]

Tincture of nux vomica.

Hydrobromate of quinine.

Sparteine sulphate of great value ("Lancet," vol. i., 1887, p. 1278).

MULTIPLE SCLEROSIS.

[Arsenic, Hyoscyamine Nitrate of silver, } Ziemssen, loc. cit., vol. xiii., p. 512.- TRANS.]

NÆVUS.

Absolute alcohol.

Carbolic acid.

Iron (by interstitial injections).

NEURALGIA.

Aconitine (of special use in neuralgia of the trigeminal).

Arsenic.

Atropine. [This alkaloid was regarded by Anstie as the remedy, *par excellence*, in abdominal pains and pelvic neuralgia.—TRANS.]

Atropine with morphine.

Caffeine.

Carbolic acid.

Cedrin.

Chloral hydrate.

Croton-chloral.

Chloroform (in trigeminal neuralgia).

Cocaine.

Codeine (of doubtful efficacy).

Colchicine.

Coniine.

Daturine.

Ergotin and ergotinine.

Gelsemine.

Hyoscyamine (uncertain).

Iodoform.

Morphine.

Napelline in hysterical and lumbo-sacral neuralgia).

Nitrite of amyl.

Nitroglycerin.

Osmic acid (uncertain in its effects).

Quinine.

Quinoline.

Saponin.

Sodium chloride.

Solanine.

Thebaine.

Veratrine.

Water.

Zinc chloride.

ORSTRUCTION, INTESTINAL.

Atropine.

ŒDEMA (SEE DROPSY).

ŒDEMA, MALIGNANT.

Carbolic acid.

OVARIOTOMY.

Ether for lowered temperature after operation.

PAIN.

Alcohol.

Atropine.

Atropine with morphine.

Cantharidin.

Chloroform.

Cocaine for local pain.

Iodoform.

Morphine.

Water.

PALPITATION.

Aconitine.

Atropine.

Nitrite of amyl.

Nitroglycerin.

PARALYSIS.

In hemiplegia and paraplegia of old-standing, in facial and radial paralysis, and in paralysis of the vocal cords and of the crico-thyroid muscle, strychnine. In glosso-labio-laryngeal paralysis, picrotoxine.

PARALYSIS AGITANS.

Arsenic.

Curarine (*see* Ziemssen, loc. cit., vol. xiv., p. 409).

Daturine.

Hyoscyamine.

Morphine.

PARTURITION (see LABOR).

PERSPIRATION, EXCESSIVE.

Aconitine.

Agaricin (especially in the night

sweats of phthisis, in which, however, it is inferior to atropine).
Atropine.
Cotoin.
Duboisine.
Homatropine hydrobromate, (according to Dr. Murrell this is of less use than atropine).
Hyoscyamine (to control sweating in phthisis and intermittent fever).
[Muscarine ("Practitioner," vol. xxv., p. 89).
Nitrite of amyl ("Practitioner," vol. ii., 1879, p. 97).—TRANS.]
Picrotoxin.
Pilocarpine.
Physostigma, preparations of.
[Quinine ("Brit. Med. Jour.," vol. i., 1878, p. 952).—TRANS.]

PERTUSSIS.

Aconitine.
[Atropine, "Lond. Med. Rec.," vol. viii., p. 308.—TRANS.]
Coniine.
Quinine.
Quinoline.
[Resorcin has been used successfully as a topical application to the rima glottidis, but it does not appear to have been used hypodermically as yet.—TRANS.]

PHTHISIS.

Benzoate of sodium.
Carbolic acid.
Cotoin (when excessive diaphoresis).
Creosote.
Eucalyptol and other microbicides ("Brit. Med. Jour.," 1887, vol. i., p. 588).
Iodoform.
Quinine hydrobromate.
Water injected over larynx to relieve cough and irritation.

PLACENTA, RETAINED.

Nitrite of amyl ("Brit. Med. Jour.," vol. i., 1882, p. 457).

PLEURISY.

Caffeine when there is effusion (of doubtful efficacy).
Cherry-laurel water.
Coniine.
[Morphine, in acute pleurisy to relieve pain.—TRANS.]
Pilocarpine.

PLEURO-PNEUMONIA.

Carbolic acid

PNEUMONIA.

Apocodeine, Apomorphine, Aponarceine } as depressants.
Antimony.
Antimony with morphine.
Benzoic acid, used successfully by Rohde in a case of imminent danger.
Coniine.
Pilocarpine.
Quinine and Quinoline.
Strychnine.
Veratrine.
[Antipyrine has often been given with marked benefit per os, but as yet it has not been administered hypodermically in pneumonia.—TRANS.]

POISONING, GENERAL.

Apomorphine. (This remedy is to be avoided in poisoning by chloral, chloroform, and morphine.)
Emetine.
Tartar Emetic.
(*See* also Table of antidotes and antagonisms.)

PROSOPALGIA.

Aconitine.

PROSTATE, ENLARGEMENT OF.

Iodoform.

PRURIGO.

Carbolic acid.
Chrysarobin.
Solanine.

PSORIASIS.

Arsenic.
Chrysarobin.

PTOSIS.

Calabar bean, extract of, and physostigmine.
[Strychnine recommended by Erb (Ziemssen, loc. cit., vol. xi., p. 486).—TRANS.]

PUERPERAL FEVER.

Aconitine.

Ammonia by intravenous injection.
Antipyrine.
Arsenic (of doubtful value).
Benzoate of sodium.
Carbolic acid (of no use).
Eucalyptol.
[Quinine hydrobromate.—TRANS.]
Thalline.

PUPURA HÆMORRHAGICA.

Ergotin.

PUSTULE, MALIGNANT.

Carbolic acid.
[According to some recent researches of Dr. Klein ("Practitioner," vol. xxxiv., p. 233), it appears that carbolic acid is neither the only nor the most efficient germicide. He found that phenylpropionic and phenylacetic acids exert a powerfully destructive influence on the bacilli of anthrax, though they have no effect on the spores. The practical value of these agents in anthracoid diseases has not yet been tested.—TRANS.]
Iodine.

PYÆMIA.

Carbolic acid ("Lancet," vol. i., 1885, p. 784).
Cedrin.
Quinine and quinoline.

RETENTION OF URINE.

Ergotin.
[I have found injections of atropine and morphine useful.—TRANS.]

RHEUMATIC ARTHRITIS.

Colchicine.
Potassium iodide (of little value).
[Quinine salicylate in the hands of Dr. Pollock and others has yielded good results by internal administration. Owing to its sparing solubility it is not adapted for hypodermic use.—TRANS.]

RHEUMATISM, ACUTE.

Aconitine.
Antipyrin.
Carbolic acid (may be discarded now for salicylic acid).
Colchicine.
Ichthyol.
Morphine.
Quinine.
Pilocarpine.

RHEUMATISM, CHRONIC.

Aconitine.
Arsenic [I have used two-drop doses of Fowler's solution with four grains of sodium salicylate hypodermically in one case of chronic rheumatism with considerable benefit.—TRANS.]
Atropine.
Colchicine.
Ichthyol.
Napelline.
Nitrate of silver.
Quinine.
Veratrine.
Water.

RETINA, DETACHED.

Pilocarpine.

RICKETS.

Iodoform.

RUPIA.

Arsenic.
Iodoform.
(Mercury in rupia syphilitica.)
Quinine.

SALIVATION.

Atropine.
Cotoin and paracotoin.

SARCOMA.

Arsenic, in general sarcoma of the skin.
Turpentine by interstitial injections.

SCIATICA.

Cantharidin (of little use).
Chloroform, in obstinate cases.
Colchicine.
Creosote with morphine.
Ergot.
Ether.
Hyoscyamine (unsatisfactory).
Morphine.
Napelline.
Resorcin.
Saponin.
Sodium chloride.
Solanine.
Strychnine.
Turpentine (of no use).
Water, iced.

Zinc chloride.

[To the above list may be added:

Atropine.

Atropine with morphine.

Nitrate of silver.

Osmic acid (see Neale's "Digest," Appendix, 1237.6 and 1240.3.) See also a report of some experiments by Fränkel, extracted from the "Berliner klin. Wochenschrift," 1884, No. 15, in the "Practitioner," vol. 34, p. 48. It appears from these experiments that although the effects of osmic acid are local, they are permanent (the axis cylinders are stained by osmic acid during life in the same way as after death), and caution in its use is therefore necessary.

Quinine and morphine.

Water.—TRANS.]

SCROFULA.

Iodoform.

Pereirine hydrochlorate.

Tayuya (said to have yielded marvellous results in the hands of some Italian physicians. These results have not been obtained by German and other investigators).

SHOCK.

Alcohol.

Ammoniated alcohol.

Ether and Hoffmann's anodyne.

SMALL-POX.

Ether, in collapse.

Opium and ether ("Lond. Medical Record," vol. xiv., p. 112).

SPASM.

Coniine.

Solanine.

SPHINCTERS, PARALYSIS OF.

[Strychnine. Recommended by Erb, Ziemssen, vol. xiii., p. 189. —TRANS.]

SPINAL CORD, DISEASES OF.

The following list is chiefly compiled from Professor Erb's valuable treatise in Ziemssen, loc. cit., vol. xiii. Most of the remedies enumerated have been used, and all of them may be used, hypodermically in diseases of the cord.

Arsenic. Improves general nutrition and exerts a tonic influence on the nervous system.

Atropine. Has been recommended by Brown-Séquard in fluxionary hyperæmia.

Coniine. Controls reflex spasm.

Curarine. Is so uncertain in its effect that it should be discarded.

Ergot and ergotin. Useful in fluxionary hyperæmia and paraplegia. Dose of the watery extract ½ to 1½ grains hypodermically.

Gold and sodium chloride. The precise mode of action of this remedy on the spinal cord is, as yet, unknown.

Nitrate of silver. Is of the greatest use in the various forms of sclerosis of the cord.

Quinine in spinal pains and weakness and in affections of the cord having a malarious origin.

Physostigmine and physostigma extract are used in cases of exaggerated reflex action, *e.g.*, tetanus, strychnine poisoning, and reflex contracture.

Strychnine nitrate in doses of $\frac{1}{33}$ to $\frac{1}{2}$ of a grain; to be used only in old cases of paralysis, or "when the principal lesion has been repaired without a full recovery of function." It is positively injurious in tabes, myelitis, and irritative diseases.

SPLEEN, ENLARGEMENT OF.

[Arsenic. Peiper, of Greifswald, has used parenchymatous injections of a whole syringeful of Fowler's solution, about once a week, in cases having a malarial origin. This method cannot be used in leucocythæmia or in the hæmorrhagic diathesis ("London Medical Record," vol. xii., p. 161).

Quinine (Neale's "Digest," 1882, 989.4)—TRANS.]

Quinoidine.

SPRAIN.

Sodium chloride.

SUNSTROKE.

Ammonia, in a case complicated with alcoholism.

[Antipyrine (3-grain doses in a 50-per-cent solution; causes little or no irritation). See two interesting cases recorded by Dr. Westbrook ("Med. Times and Gazette," 1885, vol. ii., p. 410). In one of these cases after the injection of 3 grains

of antipyrine the temperature fell in 35 minutes from 110° to 101°. —TRANS.]

Quinine.

SYNCOPE.

Alcohol.
Ammonia.
Ether.
Nitrite of amyl.
Nitroglycerin.

NOTE. [Nitrite of amyl and nitroglycerin will prove of service in those cases of syncope which are due to spasm of the vessels of the surface, and are characterized by small pulse and labored action of the heart. This condition is sometimes seen in anæsthesia produced by ether, and, if not promptly treated, is one of imminent peril. In experiments on rabbits I have found that this effect of ether (which is very apt to occur in these animals) is quickly overcome by the administration of amyl nitrite. These phenomena probably find their explanation in the effects produced by various agents on the depressor fibres of the vagus nerve. Cyon has shown that the function of these fibres is to transmit impressions from the heart to the vaso-motor centre, so as to inhibit the action of this centre and thus cause dilatation of the smaller vessels. Now, if ether causes contraction of the smaller vessels while at the same time it paralyzes the depressor fibres, it follows that the heart will become fatigued by its efforts to force blood into the larger vessels where there is great arterial tension. The effect of amyl nitrite is to antagonize this action of ether.—TRANS.]

SYPHILIS.

Calomel.
Gold chloride.
Iodoform.
Metallic mercury.
Mercury bichloride with atropine. Mercury bichloride with cocaine.
Mercury bichloride with morphine.
Mercury bichloride with sodium chloride.
Mercury biniodide.
Mercury with blood serum.
Mercury formamidate (in mild cases).
Mercury glycocholate.
Mercury with urea.
Pilocarpine.
Potassium and gold double cyanide.
Potassium iodide (of doubtful efficacy).
Potassium iodide with morphine.
Sodium iodide.
Tayuya.

TABES SPINALIS (see LOCOMOTOR ATAXY).

TEETH, DISEASES OF (TOOTHACHE).

Chloroform (must be used wth caution).
Cocaine, occasionally useful.
Iodoform.
Veratrine.

TETANUS.

Aconitine.
Atropine. (Administered successfully by, among others, Mr. Greenwood, in doses of $\frac{1}{60}$ to $\frac{1}{30}$ of a grain every six hours, see "Lancet," '83, vol. ii., p. 725).
Calabar bean, extract of, or physostigmine.
Canna'bis Indica.
Chloral hydrate.
Coniine.
Curarine.
Daturine.

[Morphine (combined with internal administration of nitrite of amyl) used successfully by Dr. Dunlop of Glasgow ("Lancet," 1882, vol. i., p. 481). Morphine injections by themselves were tried unsuccessfully as far back as 1859 by C. Hunter (Braithwaite's "Retrospect," vol. xxxix., p. 56).—TRANS.]

Narcotine.

TIC, CONVULSIVE.

Curarine.

TREMOR.

Arsenic.
Calabar, extract (of little use).
Chloral hydrate.
Daturine.
Hyoscyamine.
Morphine.

TRISMUS NEONATORUM.
Physostigmine.

TUBERCULOSIS.
Cannabis Indica (in chronic form).
Carbolic acid.
Quinine.
Quinoline.

TUBERCULAR INTERMITTENT FEVER.
Quinine.

TUMORS.
Cocaine, as a local anæsthetic before operation.
Osmic acid, } by interstitial in-
Turpentine, } jection.

TYPHOID FEVER.
Ammonia, solution of, in collapse ("London Medical Record," vol. xiii., p. 286).
Ammonium carbolate and carbolic acid.
Antipyrine.
Aspidospermine.
Ether in adynamia.
Eucalyptol and other microbicides ("Brit. Med. Jour.," 1887, vol. i., p. 588.)
Milk, dilute, acts both as a nutrient and an antipyretic.
Musk, in adynamia.
Quinine and quinoline.
Sodium salicylate (as a rule unsafe).
Strychnine arseniate.
Water, iced.

TYPHUS FEVER.
Ammoniated alcohol (in adynamia).
Benzoic acid, quinine and urea hydrochlorate.

ULCERATION (CANCEROUS AND SYPHILITIC).
Iodoform.

URÆMIA.
Antihydropin.
Benzoic acid.
[Morphine, to control convulsions, has been used successfully in a child of 6 years ("Brit. Med. Jour.," 1885, vol. ii., p. 700).
Pilocarpine. In two cases of post-scarlatinal convulsions in children I have used nitrate of pilocarpine with the happiest results—TRANS.]

URTICARIA.
Benzoate of sodium.
Chrysarobin.

VAGINISMUS.
Atropine.
Cocaine.

VARICES.
Ergotin interstitially.

VOMITING.
Atropine.
Hydrocyanic acid.
Iodoform.
Morphine.
Sodium sulphate.
Solanine.
Zinc sulphate.
Water.

WORMS.
Cedrin.

WOUNDS, SLUGGISH.
Iodoform.

WRITER'S CRAMP.
Strychnine.

MEDICAL JOURNALS

PUBLISHED BY

WILLIAM WOOD & COMPANY

56 & 58 LAFAYETTE PLACE, NEW YORK.

THE MEDICAL RECORD,

A WEEKLY JOURNAL OF

Medicine and Surgery.

$5.00 A YEAR.

WOOD'S

MEDICAL AND SURGICA

MONOGRAPHS.

PUBLISHED MONTHLY.

$10.00 A YEAR.

Club Discounts

When several of the Journals

ADDRESS, *the follo*

Medical Record,
Am. Jour. of Obstetrics,

Medical Record,
M. & S. Monographs,

Am. Jour. of Obstetrics,
M. & S. Monographs,

Medical Record,
Am. Jour. of Obstetrics,
M. & S. Monographs,

The Prices, Clubbing Rates, and T
PRINTED. No VERBAL agreement wh

Notice of CHANGES and Orders fo
Company, and in order to discontinue a su
Parties accepting Journals from the Post O

The Postal Laws especially forbid Pos
Periodicals, at request of Subscribers.

Journal bills when sent are made at full prices. *The*
can be deducted from the amount of the bill if payment is made according to the terms of subscription.

There are five ways by which money can be sent at our own risk—in a Post Office Money Order, Draft, Check, or an Express Money Order, and when none of these can be procured, in a Registered Letter. All Postmasters are required to register letters whenever requested to do so.

If you send your money in any other way, you must do it at your own risk.

POSTAL NOTES are not a safe way to send money. Any one can get the money on them, and, if lost or stolen, the money cannot be recovered, as no duplicates are issued. Subscribers who send us Postal Notes do so at their own risk.

THE AMERICAN JOURNAL

Biological & Medical Serials
297923
Author
Title Wood's medical and surgical monographs, 3 v. 1889
DATE.
NAME OF BORROWER.

University of Toron
Library
Biological & Medical Serials

DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET

Acme Library Card Pocket
Under Pat. "Ref. Index File"
Made by LIBRARY BUREA